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GENERAL
THERAPEUTICS
AND
MATERIA MEDICA,
ADAPTED FOR A
MEDICAL TEXT BOOK.

BY ROBLEY DUNGLISON, M.D.
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IN TWO VOLUMES.
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PREFACE.

A SECOND edition of the work on General Therapeutics being called for by his publishers, the Author has deemed it advisable to incorporate with it an account of the different articles of the Materia Medica. To this he has been led by the circumstance, —that the departments of General Therapeutics and Materia Medica are always associated in the medical schools.

In preparing the details on the latter department, the Author has not considered it advisable to go farther into the natural and commercial history of drugs than was indispensable for the medical student. He would fain hope, that the time may arrive when an acquaintance with the different branches of Natural History may be esteemed an essential, preliminary or accompanying study; but as the medical schools, of this continent, are now constituted, any lengthened investigation of these subjects by the Professor would be manifestly impracticable. In the short time allotted to a session of medical lectures, there is scarcely opportunity afforded to teach that which is indispensable to the therapeutist.

In all cases, the Author has referred to the position held by the drug as an article of the organized, or of the inorganic kingdom; as well as to general matters of interest relative to the place where it is found; the manner in which it is obtained; and to certain points connected with its commercial history; but next to therapeutical applications, he has dwelt more at length on the sensible properties, by which the physician may be enabled to judge of the various articles from his own observation.

In another work, (*The Medical Student*, p. 128, Philadelphia, 1837,) the Author has remarked, that "it would, doubtless, be well, that the physician should know the natural history of the animal whence he obtains his castor, his musk, &c., and that he should be acquainted with the botanical relations of the plants, whose preparations he prescribes; but such a knowledge is no more *indispensable*, than Greek is to an acquaintance with medical technology. The argument may, indeed, be extended to the consumer of the products of the animal and vegetable kingdom as articles of diet. It would be well for him, no doubt, to be acquainted with the natural history of the ox, the sheep, the hog, &c., whence he derives his sustenance; yet, notwithstanding his ignorance on this point, universal experience demonstrates, that he has no difficulty in appropriating them to his dietetic necessities."

Moreover, there are already valuable works in which all these topics, so interesting to the apothecary especially, are given at such length as almost to exhaust the subject; and of these one of the most remarkable is that of Dr. Pereira, which is now in the press under the competent supervision of Dr. Carson, Professor of Materia Medica in the Philadelphia College of Pharmacy. Of this, the Author has availed himself in the preparation of the present work. He is likewise greatly indebted to the full and accurate Dispensatory of his friends Drs. Wood and Bache—his learned colleagues in the last revision of the Pharmacopœia of the United States (1842); to the Dispensatory of Dr. Christison (1842); and—to a minor degree—to the recent work on Therapeutics and Materia Medica, by MM. Trousseau and Pidoux. Nor have the modern German publications on the subject escaped his attention.

The Author's great object has been to prepare a work on General Therapeutics and Materia Medica, which may aid the medical student in acquiring the main results of modern observation and reflection; and, at the same time, be to the medical practitioner a trustworthy book of reference.

The views of General Therapeutics are essentially the same as in the first edition. The Author has subjected them, however, to a careful revision; and has been pleased to find, that the period, which has elapsed since their first promulgation, has but strengthened his belief in their general accuracy; so that he has not deemed it necessary to make many, or great modifications.

Throughout, the Author has adopted the nomenclature of the last edition of the Pharmacopœia of the United States,—a work, which ought to be in the hands of every practitioner, as a guide in the preparation of medicines; and he has endeavoured to arrange the articles in each division, as nearly as he could, in the order of their efficacy as therapeutical agents.

ROBLEY DUNGLISON.

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GENERAL THERAPEUTICS

AND

MATERIA MEDICA.

CHAPTER I.

GENERAL CONSIDERATIONS.

THERAPEUTICS DEFINED—INSTINCTIVE ACTION OF RECUPERATION—IMPORTANCE OF BEARING IT IN MIND IN THE TREATMENT OF DISEASE—CURE BY SYMPATHY—EXPECTANT MEDICINE—EFFORTS OF NATURE—CRISES—MEDICAL EXPERIENCE—SCIENCE OF MEDICINE DEMONSTRATIVE—PRE-EMINENCE OF THERAPEUTICS—THERAPEUTICAL INDICATIONS VARY WITH MEDICAL THEORIES—NECESSITY OF DISCOVERING THE PATHOLOGICAL LESION—RATIONAL THERAPEUTICS FOUNDED ON RIGID PHYSIOLOGICO-PATHOLOGICAL DEDUCTION—IMPORTANCE OF DISCOVERING THE CAUSE OF THE LESION—ETIOLOGY OBSCURE.

THERAPEUTICS is the branch of Medical Science, which comprises the doctrine of the management of disease. Generally, however, the term is restricted to a description of the *modus operandi* of medicines; and the department is commonly associated, in our Institutions, with Materia Medica; whilst the Practice of Physic is confided to a distinct Professor. Under this division, General Therapeutics is made to embrace the principles of medicinal administration, and the indications, which the different articles of the Materia Medica are capable of fulfilling, whilst the Chair of Practice is appropriated, so far as regards Therapeutics, to the application of those principles to particular morbid conditions, or to what has been called Special Therapeutics. It is the business of the physiologist to investigate the functions of healthy man; the pathologist regards those functions in disease, and the therapeutist endeavours to restore them from the latter to the former condition.

There is no branch of medicine with which the therapeutist ought not to be acquainted. To be a good therapeutist requires not only that he shall have had extensive opportunities for witnessing disease, but shall have read extensively the recorded observations of others. It demands, too, the utmost powers of discrimination;—hence the varied knowledge, which the physician ought to possess, and the learning and dignity of the science.

It might be imagined, that lectures on Therapeutics are unnecessary, where the mode of managing individual diseases is given from the Chair of Practice; in the latter case, however, the principles are necessarily diffused—not sufficiently embodied—and, moreover, the teacher generally presumes, that the student—which rarely happens—is imbued with the great principles and rules, that apply to the administration and *modus operandi* of medicines.

In the state of health the various functions are executed in a regular and harmonious manner, and are intimately connected by consent or sympathy; but if a morbific cause impresses the organism, this harmonious condition is disturbed; a fresh series of actions results; and disorder supervenes.

Physiologists have noticed in every living body an instinctive action—an action of the living principle, whenever manifestly directing its operations to the health, preservation, or reproduction of a living frame, or of any part of it. This applies to the plant as well as to the animal. It is the *vis medicatrix naturæ*, for and against which so much has been said; but which—if restricted to the operation we have mentioned—can no more be denied than the existence of life, of which we know nothing except by its results. It is strikingly witnessed in the reparatory power exerted by living bodies after the receipt of an injury. If we tear a branch from a tree, we find, that the injury done to the parent trunk is repaired by an action analogous to that set up by the animal whenever a wound is inflicted upon it. In some vegetables, the reparatory power is so energetically exerted, that the lost parts are restored; and it is upon this power that the utility of certain garden vegetables—spinach, parsley, cress, &c.—reposes. Such a reparatory power is occasionally—but rarely—met with in the animal kingdom. We see it in the lobster deprived of its claw, and in the serpent that has lost its tail. The nails and hair, too, regain their accustomed length when cut, and the same thing happens to the teeth of the Rodentia or gnawers. (See the author's *Human Physiology*, 4th edit. ii. 613, Philad. 1841.)

Few animals, however, possess, to any extent, the power of restoring lost parts; but all are capable of repairing injuries, and of removing disease, when it is within certain limits. In cases of wounds, and broken bones, the efforts of the surgeon are chiefly restricted to keeping the parts in apposition, and to preventing the intrusion of internal and extraneous irritants, whilst his reliance is placed on those sanative powers that are seated in the wounded part, as in every part of the living frame. It is to this power, that we ascribe all the properties, assigned to the cure by sympathy, which, at one time, excited so much attention, was promulgated by the Rosicrucians, and obtained universal credence in the seventeenth century. This consisted in applying dressings, in the case of wounds, not to the injured parts, but to the weapon that inflicted them. The sympathetic powder of Sir Kenelm Digby was an application of this nature, which enjoyed the most astonishing reputation. It was first employed at Florence, in the commencement of the seventeenth century, by a Carmelite monk, who had just returned from India. The Grand Duke, hearing of the monk's marvellous cures, asked him for his secret, which he refused, fearing that the Duke might divulge it. Some time afterwards, Sir Kenelm, having rendered an important service to the monk, the latter, out of gratitude, communicated to him the composition of the powder, and Sir Kenelm took the secret with him to England. An opportunity soon occurred for testing its properties. A Mr. Howell, having been wounded in attempting to separate two of his friends, who were engaged in a duel, was subjected to its employment. Four days after the infliction of the wound, Sir Kenelm dipped one of Mr. Howell's garters in a solution of the powder, and immediately—it is asserted—the wound, which was previously painful, became easy, but as the garter grew dry, the pains returned, and were relieved by a fresh immersion of the garter in the solution. In five or six days, the wound healed. James the First; his son—afterwards Charles the Second; the Duke of Buckingham, and all the principal personages about the court, were acquainted with the circumstances of the case; and James—whose enthusiasm was not counterbalanced by much judgment, and who was, withal, superstitious in the highest degree—obtained the secret from Sir Kenelm, and performed most astonishing cures. In no great length of time the composition transpired, and as in all like cases, the charm evaporated with the disclosure. The powder, employed by Sir Kenelm, is asserted to have been sulphate of copper, prepared in a particular manner. Some affirm it to have been the ordinary green vitriol of commerce.

Dryden alludes to the superstition more than once in his "*Tempest, or Enchanted Island.*" Thus, ARIEL:

"When I was chidden by my mighty lord,
For my neglect of young HIPPOLITO,
I went to view his body, and soon found
His soul was but retired, not sallied out;
Then I collected
The best of simples underneath the moon,

> The best of balms, and to the wound applied
> The healing juice of vulnerary herbs.
> His only danger was his loss of blood;
> But now he's waked, my lord, and just this hour
> He must be dress'd again, as I have done it.
> *Anoint the sword, which pierced him, with this weapon salve, and wrap it close from air, till I have time to visit him again.*"
>
> *Act* v. scene 2nd.

And:—MIRANDA, when she enters with HIPPOLITO's sword wrapped up.

> "*Hip.* O, my wounds pain me!
> [*She unwraps the sword.*]
> "*Mir.* I am come to ease you.
> "*Hip.* Alas! I feel the cold air come to me:
> My wound shoots worse than ever.
> (*She wipes and anoints the sword.*)
> "*Mir.* Does it still grieve you?
> "*Hip.* Now methinks there's something
> Laid just upon it.
> "*Mir.* Do you find no ease?
> "*Hip.* Yes. Yes: upon the sudden all this pain
> Is leaving me—Sweet Heaven, how I am eased!"
>
> *Act* v. scene 2nd.

It is likewise referred to in the third Canto of the "*Lay of the Last Minstrel*" of SIR WALTER SCOTT.

The sympathetic ointments, applied to the weapon, or the 'armatory unguents,' as they were termed, are of various characters, containing the most absurd, disgusting, and often inert ingredients. The following extract from the "Sylva Sylvarum," or "Natural History" of Lord Bacon, strikingly exhibits this. The mode of managing the wound sufficiently accounts for the good effects ascribed to the cure by sympathy. "It is constantly received and avouched, that the anointing of the weapon that maketh the wound will heal the wound itself. In this experiment, upon the relation of men of credit, though myself, as yet, am not fully inclined to believe to it, you shall note the points following: First, the ointment, with which this is done, is made of divers ingredients; whereof the strangest and hardest to come by are the moss upon the skull of a dead man unburied, and the fats of a boar and a bear killed in the act of generation. These two last I could easily suspect to be prescribed as a starting hole, that if the experiment proved not, it might be pretended, that the beasts were not killed in the due time; for as for the moss, it is certain there is great quantity of it in Ireland upon slain bodies, laid in heaps unburied. The other ingredients are, the bloodstone in powder, and some other things, which seem to have a virtue to staunch blood; as also the moss hath. And the description of the whole ointment is to be found in the chymical dispensatory of Crollius. Secondly, the same kind of ointment applied to the part itself worketh not the effect, but only applied to the weapon. Thirdly, which I like well, they do not observe the confecting of the ointment under any certain constellation, which commonly is the excuse of magical medicines when they fail, that they were not made under a fit figure of heaven. Fourthly, it may be applied to the weapon, though the party hurt be at a great distance. Fifthly, it seemeth the imagination of the party to be cured is not needful to concur; for it may be done without the knowledge of the party wounded; and thus much has been tried, that the ointment, for experiment's sake, hath been wiped off the weapon, without the knowledge of the party hurt, and presently the party hurt has been in great rage of pain, till the weapon was re-anointed. Sixthly, it is affirmed, that if you cannot get the weapon, yet if you put an instrument of iron or wood, resembling the weapon, into the wound, whereby it bleedeth, the anointing of that instrument will serve and work the effect. This I doubt should be a device to keep this strange form of cure in request and use, because many times you cannot come by the weapon itself. Seventhly, *the wound must be at first washed clean with white wine, or the party's own water; and then bound up close in fine linen, and no more dressing renewed till it be whole.* Eighthly, the sword itself must be wrapped up close, as far as the ointment goeth, that it taketh no wind. Ninthly, the ointment, if you wipe it off from the sword and keep it, will serve again, and rather increase in virtue than diminish. Tenthly, it will cure in far shorter time, than ointments of wounds commonly do. Lastly, it will cure a beast as well as a man, which I like best of all the rest, because it subjecteth the matter to an easy trial."

The lines, in the above quotation, marked in italics, are the key to the solution of the whole mystery. It is, indeed, the practice, adopted at the present day, in the treatment of incised wounds, and to this—not to the influence of the sympathetic powder, or armatory ungent—it need hardly be said, must the main curative agency be ascribed, whilst a portion may be assigned to the mental revulsion produced on the sufferer, through his faith in the virtues ascribed to the application. The wound was carefully defended from the irritation of extraneous substances, and given up to that instinctive principle, which, we have seen, repairs the injuries to which organized bodies are liable; and it has been suggested, that the results furnished the first hint that led surgeons to the improved practice of healing wounds by what is technically called—the 'first intention.'

The existence, then, of such an instinctive power can neither be denied nor lost sight of in the treatment of disease. The error has been, that undue weight has been attached to it, so that the practitioner was altogether guided by its manifestations—or fancied manifestations—in laying down his indications of cure; and if no such manifestation existed, he waited vainly—and too often most unfortunately—until the time had perhaps gone by for the successful administration of efficacious agents. To this system of 'waiting, or expecting' the term *medicina expectans—la médecine expectante*—was appropriated. The followers of Stahl—the great apostle of the doctrine—supposed a power to be present in the system of repelling morbific influences, and of re-establishing equilibrium when disturbed. There are but few cases, however, in which this power can be safely trusted to. It too often happens, that diseased action in a tissue or organ goes on augmenting, until the functions of other tissues and organs become deranged by sympathy, and disorganization and death follow. Yet the doctrine of Stahl is still maintained by many practitioners—of the old world more especially; and, by many who reject it, terms are frequently employed, which may be regarded as its relics. We often hear, for example, of 'efforts of nature,' yet the ideas attached to the expression are very imprecise. If a diarrhœa should supervene about the favourable termination of a protracted fever, it is looked upon as 'critical;'—as a *bénéfice de ventre*, or a *bénéfice de la nature;* but if, on the other hand, diarrhœa supervenes in phthisis pulmonalis, as an accompaniment of the hectic fever, proves colliquative, and hastens dissolution, we hear nothing of its being an effort to disembarrass the economy—or of its constituting a crisis. If, again, an individual have suffered under headache, giddiness and other symptoms of uneasiness about the head, and epistaxis take place, after which the symptoms are removed or mitigated, the hemorrhage is regarded as an effort of nature, although it was doubtless dependent upon the same pathological condition that gave rise to the headache and the other symptoms; but if the hemorrhage occur to such an extent as to excite alarm, or to prove fatal, nothing is said of its being an effort of nature. In the same manner, if hemorrhage occur in the brain or in the lungs we rarely or never hear this mode of accounting for it.

Yet, although we may discard the notion of efforts of nature, there is no doubt, that good occasionally results from spontaneous discharges, and that, at other times, their supervention indicates a change in functions which may have been long disordered, and a restoration to the healthy condition. Thus, where polyæmia or plethora exists in the vessels generally, or in some portion of the economy, the supervention of moderate hemorrhage may diminish the intensity of the cause; and diarrhœa, or perspiration supervening in a fever of some duration, in which the functions of secretion have been disordered, may indicate, that the organs of secretion are assuming a new condition, and that the morbid catenation, previously existing, is beginning to disappear. Although, therefore, we may not be justified in regarding such discharges as indicating any effort of nature, they may be, and doubtless, frequently are, salutary

An attention to these topics will lead to the combating of irregularities when they occur in the organic actions, provided they are beyond the due point; and, at the same time, teach us not to interfere too much with the instinctive actions, provided they seem to be going on favourably. The therapeutist must be guided, however, by observation and reflection as to his rule of conduct in each case. In the very complex operations of the animal frame, the relation between cause and effect is not always readily appreciable; great caution is, therefore, necessary on the part of the observer, lest, in the place of *facts*—properly so called—he should register such as have been termed—not inappropriately—'false.' Should he incur this error, owing either to the intrinsic difficulty of the subject, or to the incompetency of the observer, a foundation may be laid for other erroneous observations and deductions, and experience may thus be acquired, but it is experience, in its sequel, most unfortunate. The public are, unhappily, too apt to be led away by this idea of experience; erroneously believing that all are capable of profiting by it, and, consequently, that every one who has been sufficiently long engaged in the pursuit of his profession must necessarily be experienced and wise. Were all men equally attentive and equally gifted with adequate powers of observation and reflection, the deduction would be just; but this is by no means the case. If a man cannot observe and reason on topics of a general nature, he cannot on such as appertain to medicine; and, accordingly, the best rule for estimating the abilities of the physician by the unprofessional is by examining into the character of his mind, his modes of reasoning, his degree of mental application, and his general qualifications. A man of ordinary mind, application, and attainments may register a few facts; and, by comparing them together, may deduce useful inferences so far as these facts may permit, and in this way may prescribe sufficiently well in ordinary cases; but such cases are not the touchstone of knowledge. In the multitude of trying cases that present themselves to every practitioner, in the course of his career, what painful anxiety is felt by him, if he be well informed in his profession, and, withal, a philanthropist! What careful comparison of his own experience with the recorded experience of others! What an amount of physico-moral reflection before he decides! Perhaps in no other profession or calling are the intellectual and moral feelings so much enlisted; but what consolation awaits the physician, when he can feel satisfied, that the result, at which he has arrived, accords with the demands of the case,—that the decision is adequate to the emergency! These are cases in which ignorance is bliss, but how fearful the responsibility of such ignorance! Views, like these, have given occasion to legislative enactments—which are every where too inoperative—to protect the public against the ignorant, the mercenary, and the—too often—unprincipled pretender. The curriculum of study, required in the different Medical Colleges, has been suggested by a wise care for the lives and the health of the public, and such a period of attendance upon the lectures that constitute it has been prescribed, as may enable the industrious—even if not highly gifted—to qualify themselves for entering upon the broad field of observation, and of extended usefulness into which their avocation may carry them. It is within collegiate walls, that the student acquires the prominent facts of his profession, and the great principles appertaining to its practical administration. He there learns the theory on which all sound and rational practice is based. Too often, amongst the uninformed, the theoretical and the practical pursuit of a calling are placed in unworthy contrast. In no art can sound practice exist without theory. Theory is the mental process, which binds observed facts together; compares them with each other, and deduces appropriate rules of practice. Very different is this from the hypothesis that emanates from assumptions not proved. It is to theory—as above defined—and as it is now understood every where amongst the scientific, that we are indebted not only for full practical usefulness, but for every science. Facts are, doubtless, the elements of science, but the science itself does not exist, until these facts have been brought together, sifted and compared, and great general principles deduced therefrom.

In such sifting and comparison, a multitude of miscalled facts have to be discarded. In the science of medicine—in every science—those that merit the epithet *false* are numerous, and many of them rest on the authority of the heedless observer, who arrives at his conclusions without due examination. The theoretical investigation of science renders a man cautious even to scepticism. Very few, therefore, of the mass of recorded facts originate with him: he has little to do in accumulating the chaff that envelopes the grain. The records of the Patent Office of every country tend to elucidate this matter. It has been properly observed, that every patent is a speculation. Who, then, are the great speculators? Not the theoretical men, in the sense in which we have used the term, but what are called practical men,—men, who narrow themselves down to observed facts in their own profession or calling, and who, in consequence of their ignorance of theory, soon find that their inventions are no important additions to existing knowledge. A writer on this subject asserts, that he has made a rough estimate of the number of scientific persons who have published works relative to new inventions in arts, and he finds, that in Europe they did not exceed two hundred during the whole of the last century, whilst there are not fewer than that number of patents taken out in England annually. An adequate acquaintance with scientific truths would prevent this waste of time and of talent; and hence it is, that in every science or art, a combination of theoretical and practical knowledge is necessary to lead to lofty and enduring results. This is the great improvement in the modern method of teaching the practical sciences. That, which was formerly oracularly delivered from the chair as the result of the experience of the master, is not now promulgated as indisputable. It is placed before the inquirer as a fact, over and over again examined and scrutinized, and the reasons for any opinion are fairly stated as elements for his decision. The time has passed away, when the human mind is to credit the mere *verba magistri*, or to place implicit credence in a scientific assertion, without examination, because it proceeds from this or that individual. The rule of conduct, implied in the language of the Roman Satirist,—'Marcus dixit, ita est'—

> "Did Marcus say 'twas fact? then fact it is:
> No proof so valid as a word of his"—

has been too much inculcated in all ages, and no science has suffered so much from it as medicine. It has been properly remarked by Dr. Abercrombie, in his "Inquiries concerning the intellectual powers and the investigation of truth," that in receiving facts on the testimony of others, we require to be satisfied not only of the veracity of the narrators, but also of their habits as philosophical observers, and of the opportunities, which they have had of ascertaining the facts. In receiving affirmed truths, therefore, the inquirer has to exercise caution; but at the same time to be careful lest by attempting to avoid one error he may incur another, and may pass from credulity to ill-judged scepticism,—extremes, which the mind, anxious after truth, will carefully avoid.

In the management of disease it is not always necessary that drugs should be given, unless their use is clearly indicated; or unless in the case of certain nervous and impressible individuals, whose faith is not reposed in any system of medication, that does not include the use of internal medicines. To obtain this faith is an important desideratum, as will be seen hereafter, in the treatment of many diseases, of a nervous character especially. The physician exhibits his skill better by controlling disease by appropriate regimen than by administering combinations of whose effects he often knows little, and where much of his practice must necessarily be involved in conjecture. The science of medicine is more demonstrative than is usually imagined, and, where the case is not so, the practitioner had better for the time do nothing. Any experiment may have one of two opposise results: it may do *good*, or *harm;* and hence, a practitioner is not justified in administering a powerful medicinal agent at random. If he be desirous of instituting experiments, he ought to take example from some modern therapeutical inquirers in Germany, and make them upon himself, rather than upon his patients. It cannot often happen, however, that the physician is at a loss what course to pursue. His physiological and pathological knowledge will indicate what ought to be the great principles of management; and his acquaintance with the remedial virtues of the different articles of the materia medica will suggest the proper agents for carrying those principles into action.

To elucidate this, the case of the drug opium may be taken. It is known that it will allay irritation, and produce sleep; a knowledge acquired from observation. It is known also, that in a large dose it is sedative; in a small dose stimulant. When a case of inflammation occurs, we are not deterred from its use, because it excites in a small dose, but give it in a quantity sufficiently large to insure the sedative operation. Accordingly, observation and reflection have led to the employment of this useful drug in cases where the practitioner, a few years ago, would not have ventured upon it. It is by empirical trials, that we become informed of the properties of any medicinal agent, after which sound physiological and pathological knowledge suggest its correct application.

The great object of the science of medicine is to remove disease. Hence the pre-eminent importance of Therapeutics. It has been largely modified by prevalent systems or doctrines, yet it bends less to theory than any other branch of medicine, and, accordingly, many of the different sects which have existed from time to time have been overthrown by this great test of their validity or weakness. In the closet, a consistent scheme may be formed on paper, but when it comes to be applied clinically, it may be often found to fail. It is obvious, that, *cæteris paribus,* Therapeutics should be the touchstone of medical skill: the number of cures ought to decide the qualifications of the practitioner; but it is so extremely difficult—indeed impossible—to estimate all the deranging influences;—so many modifying circumstances are perpetually occurring, that we cannot decide that any two cases are precisely identical. Hence, we can never judge of the comparative success of different practitioners, on which so much stress is placed—and placed erroneously—by the public. Owing to these difficulties, also, we have such a diversity of sentiment regarding the treatment of the same affection.

Therapeutical *indications,* vary much, however, with medical theories. By indication is meant—the end to be had in view in the administration of remedies. For example, in a case of polyæmia or fulness of blood, the indication is obviously to diminish the amount of the circulating fluid, and bleeding is the remedy usually had recourse to for fulfilling it.

Indications of treatment have necessarily been greatly influenced by the views of the dominant medical sect. The humorist or humoral pathologist, who looked to the fluids as the cause of all maladies, directed his attention to the removal of a fancied acridity, acidity, or alkalescency of the humours, or to evacuate them after they had experienced a kind of maturation or preparation, which he called *concoction;* whilst the mechanical philosopher attended to the permeability, or the contrary, of vessels,—the effects of gravity, and the like; and his indications were based upon his ideas on those matters. But these systems, and the Therapeutics founded on them have passed away; not, however, without having left useful mementos of their existence; for it is obvious, that the conditions which they invoked cannot be wholly disregarded: the evil with those pathologists was, that they assigned to them too prominent a rank in the causation of disease, and that they attended to them to the exclusion of more important agencies.

One of the greatest errors in the investigation of disease, and its mode of management, is the belief which long existed, and still exists with the mere routine practitioner, that it is only necessary to attend to symptoms or phenomena, and to combat the most prominent as they occur. This is obviously insufficient without inquiring into the organ that is suffering, and the precise nature of the existing lesion. The same symptom may be present in diseases of very different character; and before the therapeutist can lay down any satisfactory indications of treatment, inquiry must be made into these circumstances, as well as to detect whether the mischief in the organ is primary or secondary, idiopathic or symptomatic;—in other words, whether the morbid mischief has commenced in the main seat of the disease, or has begun in some other organ or tissue, and extended to it by virtue of that sympathy which plays so important a part in every physiological, as well as pathological condition of the functions.

The insufficiency of attending simply to the more prominent symptoms is readily elucidated by a few cases. A feeling of debility is a distressing symptom in the most inflammatory, as well as in the most enfeebling, disorder; yet how different the treatment! Itching of the glans penis is symptomatic of stone in the bladder. Itching of the nose, where the mucous membrane commingles with the skin, occurs in irritation of the lining membrane of the intestinal canal: in hepatitis, excruciating pain is occasionally felt at the top of the shoulder: painful retraction of the testis occurs in nephritis; and intolerance of light and sound are distressing symptoms of cephalitis; but it would be extremely unphilosophical to attend solely or mainly to those prominent symptoms. The primary seat of irritation must be inferred from them, and from farther attentive examination; and it is not until the physician has attained a thorough knowledge of the seat and nature of the disease, that a rational basis can exist for his curative indications. The lesion of the affected organ must be appreciated. This is the point of departure for an enlightened practice. To resolve this question demands a careful inquiry into etiology, as well as into physiological pathology, and not until this has been effected can the practitioner determine properly on the indications that require fulfilment, and on the mode of fulfilling them.

The fundamental object, in every indication, is to put a stop to, or mitigate the disorder in the organic actions, and to remove any alteration that may have supervened in the tissues consequent on such disorder. If inflammation, for example, takes place in any organ, the indication is, during the active stage, to remove the particular state of vessels, which constitutes the morbid condition; and if suppuration, induration, or any other of the terminations of inflammation should ensue, to have recourse to the appropriate remedies for their removal. When once the primary organic lesion is removed, the symptoms occasioned by it will disappear, unless, as in the case of the terminations of inflammation, irritations—which have become independent of the primary affection—should persist, and give rise to a particular train of symptoms. The attention of the therapeutist has, consequently, to be directed, in the first instance, to the primary lesion, and afterwards to the secondary or symptomatic.

The nature of the disease, then, or the precise species of vital modification of tissue, that gives occasion to the morbid phenomena, must be the base of every therapeutical indication; and although the symptoms or manifestations may differ in the different ages and sexes, and according to the strength, &c., of the patient, the indications will be essentially the same; and the treatment will rest on the same general principles, requiring modifications according to circumstances, but these constitute secondary considerations. Particular causes, seat, organisation, &c., of the disease may suggest modifications of treatment,—may induce us to select one drug or combination, or one form of administration rather than another,—but the great indications will usually be identical, and the lesion, in all cases, must be regarded as virtually the same. In inflammation, for example, the general rule must be laid down, that the ordinary antiphlogistic remedies are indicated; and this, whatever may be the seat of the inflammation, or the strength, age, habit, &c., of the patient; still, many modifications in the treatment may be demanded according to these various circumstances. It has been already remarked, that the ordinary antiphlogistic remedies are required, as a general rule, in inflammation. This morbid condition is, however, at times, extremely difficult of detection, in consequence of circumstances attending it, which are inappreciable except by experiment, and very frequently afterwards. To explain this, the case of a blood-shot eye may be taken,—a state of the conjunctiva in which red blood is forced into vessels that previously conveyed only white blood. A grain of sand, or some extraneous substance, has excited irritation in the conjunctiva, and the consequence has been an afflux of fluids to the irritated part. The red vessels continuous with the white vessels have taken upon themselves augmented action; red blood has been sent into the white vessels, which are not intended to receive it in health, and these have become over-distended, so that, in the case assumed, there is an over-distended state of extreme vessel, and an over-excited state of the red vessel communicating with it. This is a familiar and striking example: it does not, however, apply only to the white and red vessel, but to every case of inflammation, if we put the capillary or extreme vessel for the white vessel, and that communicating with the capillary vessel for the red vessel in the case assumed. In this state of parts, it is manifest, that so long as the extreme vessel remains over-dilated, there will be remora of blood in it, to a greater or less extent; the circulation cannot proceed as uninterruptedly through it as through a capillary vessel, whose coats are in a condition of healthy tone: owing to this circumstance, excitement is kept up in the vessels immediately communicating with the over-distended extreme vessels, which excitement continues so long as the over-distension persists, and, in many cases, the irritation is extended from the parts first affected to the general sanguiferous system, until ultimately the heart and arteries are in a state of excitation and turmoil.

Now, a great difficulty in investigating the pathology of inflammation consists in our not always being able to discover whether this atonic condition of the extreme vessel, induced by over-distention, or the over-excited state of the vessel communicating with it, is the condition which more especially requires attention: hence the difficulty of saying, in all cases, whether astringents or slight stimulants, or the opposite plan of treatment—the soothing—ought to be had recourse to. Every practitioner meets with this difficulty, and hence, in cases of external inflammation, he is often compelled to resort empirically to one set of applications, and if it should not succeed, to the other.

In certain textures of the body the predominance of over-distention of extreme vessel appears to exist, when they labour under inflammation, more commonly than in others. This seems to be the case with inflammation of the skin, and mucous membranes, which belongs to the variety of erysipelatous inflammation; whilst that of the cellular and serous membranes is of a more active cast, and may be regarded as appertaining to the phlegmonous variety. Accordingly, in erysipelas, and in some of the inflammations of mucous membranes, remedies are occasionally had recourse to, which can rarely be employed in the other variety,—that is, in the inflammation of the cellular membrane, and of the serous membranes; for the latter obviously cannot be reached so that applications may be made immediately to them. Hence, in some varieties of burn, or erysipelatous inflammation of the skin, stimulating applications are found of service; whilst in others, where the excitement in the communicating vessels is powerful, antiphlogistic agents are demanded. Cases of varied inflammation of the eye have been given, in which decided advantage was produced by dropping the essential oil of lemons upon the inflamed surface; and, in most cases of chronic inflammation, the application of gentle excitants is found to be beneficial; accordingly, after gonorrhœa, for example, which is an inflammation of the lining membrane of the urethra, has continued for a long period, we attempt to arrest the discharge by astringent excitants, and if these are insufficient, the bougie is sometimes passed, to excite, by contact, the vessels to their healthy tone; and in this manner the gleet is often got rid of, after it had resisted the continued use of ordinary antiphlogistics.

In all these cases—as in every other—rational Therapeutics must be founded on rigid physiologico-pathological deduction.

It is important in every morbid condition to inquire into the cause, that may have produced, or is producing, the phenomena. That this must always be removed, when practicable, is a self-evident indication. The maxim, "*Tolle causam cessat effectus,*" although often true, is not always so. If a thorn be run into the flesh, irritation will exist, so long as the thorn remains there; and, if it be removed, the recuperative powers of the part will speedily repair the injury that has been inflicted. In like manner, if a decayed or loose tooth be exciting repeated gum-boils, the obvious remedy is to remove the tooth; yet in the large mass of cases, although the cause, which immediately produced the disease, is taken away, the complaint continues. A man, from a night's sojourn in a malarious district, may receive a sufficient dose of the exciting cause of intermittent fever to induce the disease, and although he may be removed from the unhealthy locality, the disease will persist after his change of residence. It may be said that, in this case, the malaria may still be present in the system, and this is possible; but it is more probable—more consistent with analogy—that a morbid influence is exerted on the nervous system from such exposure, and that the effects go on, notwithstanding the abstraction of the morbific cause; in the same manner as disease, produced by local irregularity of action in the capillary system, owing to exposure to cold and moisture, may persist, notwithstanding the removal of the cause has been complete. There is probably, at all times, a greater predisposition in the body to assume a diseased action in some particular organ or tissue than in another; so that if irregularity of capillary action be produced in any external part of the organism, the mischief may not supervene in the part where such irregularity exists, but in the organ especially predisposed to assume a morbid action, through the extensive sympathy, which exists between every part of the capillary system. Owing to this circumstance, the difficulty in discovering the precise cause of a disease is often extreme. Fortunately, the discovery is not a matter of moment, inasmuch as the disease usually continues independently of the cause; and it is the disease—the modification in the structure or functions that constitutes the pathological condition—which we have to combat. In all cases, the patient is anxious to find out, and to suggest, a cause; and the suggestions are frequently of the most unphilosophical character; but although the practitioner feels this, it is unnecessary that he should show it.

CHAPTER II.

CIRCUMSTANCES THAT MODIFY THE THERAPEUTICAL INDICATIONS.

Age—Sex—Original conformation—Habit—Climate—Mental affections—Professions, and way of life—Causes, seat, period, &c., of the disease.

Having briefly alluded to the great principles, that ought to guide the physician in laying down his indications of cure, it will be proper to glance at some of the chief circumstances that contribute to modify those indications in the treatment of disease. In all cases, general principles are to guide the practitioner, but as he has to treat individuals, circumstances may be connected with them which demand important modifications.

The circumstances of a modifying nature are many. Some are connected with age, conformation, sex, professions, habit, &c.; others with the causes, seat, intensity, period, &c., of the malady.

1. AGE.

This has considerable influence, especially as connected with the different evolutions, which the system experiences in the progress of life, and which give occasion to diseases at one period of existence, that do not occur at others, and thus modify both the rules of Hygiène, and Therapeutics.

In early infancy, there is great nervous susceptibility or impressibility, so that mischief is liable to be produced in the encephalon from slight irritations. On this account, before and during the period of the first dentition, the surgeon avoids performing any operation which he is not compelled to undertake. For the same reason, dentition itself is the cause of many phenomena of a sympathetic character, which can often be relieved only by attending to the condition of the gum. Irritation in the intestines is also the cause of many morbid affections; and the nervous impressibility, before referred to, causes them not to bear narcotics well. Again, under two years of age, large quantities of mercury may be given without the supervention of the ordinary effects of the medicine on the system. It is extremely difficult to salivate a child under two years of age, and yet at three, and afterwards, it is easy. This must be dependent upon some singular evolution, some different condition of the absorbent function, which is inappreciable in the present state of our knowledge. The mortality at this period of existence is very great, one third of the whole number of deaths in our cities occurring under two years of age. (*Elements of Hygiène*, p. 139.) In addition to the great tendency to disease of the cerebro-spinal axis, we find, in summer, a disposition to erethism of the skin and mucous membrane of the bowels; and in winter to a similar condition of the mucous membrane of the pulmonary apparatus: accordingly, cutaneous eruptions, aphthæ, diarrhœa, cholera, croup, bronchitis, &c., are common at this age, owing to the susceptibility to disease of the dermoid tissue; and convulsions, hydrocephalus (cephalitis) and other head affections, owing to the impressibility of the nervous system. During the whole of this period, a predominance of acidity is manifested in the stomach, either owing to an undue secretion of the acids met with in that organ in health, or to the reaction of the elements of the food on each other, or to both; and hence antacids are indicated, as well as occasional laxatives. The state of erethism in the mucous membrane of the intestines lays the foundation, in scrophulous habits, to mesenteric ganglionitis, and to consequent tabes mesenterica, in the same manner as a wound in the hand or foot occasions axillary or inguinal ganglionitis.

Between the age of the first dentition and puberty, including the whole of childhood, the liability to the affections that were so fatal during the first two years of existence, becomes amazingly diminished; and the peculiarities of this early stage of existence gradually, and totally cease.

At, and after, the age of puberty a surprising change is observable. A complete revolution has been effected in the economy by the development of the generative apparatus. The morbid tendency is now to the lungs; and consumption—that dread disease, which, in these climates, is estimated to destroy at least one-sixth of the population—is rife.

During the whole period of virility no particular modification is produced by the evolution of organs. All goes on with greater uniformity, so that no new morbid tendency seems to be developed. It is the standard period for all our physiological, and therapeutical descriptions, unless otherwise specified. If we speak of the dose of a medicine abstractedly, we mean the quantity usually needed by an adult male to procure the ordinary effects of the drug.

Lastly:—in old age, the nervous susceptibility becomes, in general, diminished, so that larger doses—of particular kinds of remedies at least—are needed, and a greater supply of food is demanded, in order that the enfeebled powers of chylosis may be able to extract from it the adequate supply of chyle. The torpor of the intestinal functions is at times so great, that the excrement collects in quantities in the lower part of the bowels, and occasionally becomes so much indurated, that mechanical means,—as enemata, or the use of a scoop,—are needed for its removal. The tendency, too, to disease of the urinary organs, and especially of the prostate, and bladder, is considerable at this time of life, and but few individuals attain the age of eighty, without being more or less incommoded in this manner.

Connected with the pathology of old age, Bégin, (*Traité de Thérapeutique*, tome i. p. 37,) has laid down the too general law,—that in the greater part of old people, disease is the result of chronic irritations, produced in the organs by the long continued repetition of the stimulations that accompany the regular exercise of the functions:—but this is improbable. It cannot readily be conceived how any continuance of healthy stimulations should bring on disease in these or other parts. In the exhausted condition of the nervous agency, obstruction or irregularity of action is apt to be induced; and such obstruction, or any morbid deposition, dependent upon irregularity of action, thus becomes the source of irritation, and organic disease. All the morbid affections, indeed, of old age are irritative as at other ages. Chronic gastritis, ascites, enlarged liver, visceral engorgements; chronic bronchitis in all its forms, asthma, angina pectoris; chronic affections of the heart in general:—are diseases of irritation, originating in some irregularity, not in the simple continued healthy action of the organs implicated, or in debility.

At all ages, then, the treatment of disease must be, in its general principles, the same: but it requires to be varied according to the strength of the individual, and the evolution of the organs at different periods of existence.

2. SEX.

Prior to the period of puberty, there are but few points of difference, so far as relates to this subject, between the two sexes. From organization, there is a greater mobility and impressibility in the nervous system of the female, but this is not marked before she becomes nubile, or before the genital apparatus has experienced the evolution, which befalls it at puberty. After this, all the functions are apt to be modified by the new condition of the uterine organs. A periodical discharge is established, and if this be in any manner interfered with, the organic irritation, which ought to have existed there, is transferred to other parts, and the one, most predisposed to take on morbid action, assumes it. Hence it is, that attention has always to be paid to the state of this function, when the therapeutist is called upon to examine other functions that may be deranged, and may be obscurely connected with the uterine functions, through the extensive sympathy which they maintain. This is signally manifested when the catamenia do not appear at the usual age; or when, after having occurred regularly, they become obstructed. Whilst the catamenia, too, are flowing, the female is generally extremely impressible, so that active remedies—especially such as affect the lower part of the bowels, or the urinary organs, and excite the uterus through contiguous sympathy—have to be used with caution.

The period at which the catamenia cease is also one of interest to the therapeutist. The female is then so proverbially liable to irregularity in the functions, and in the nutrition of organs, that it has been called, even by the unprofessional—'the critical period.' Prior to their total disappearance the catamenia may recur irregularly; chronic irritations may thus be developed in the sexual organs, or elsewhere. The mammæ, having lost the sympathetic influence exerted between them and the uterus, are apt to assume a morbid condition, and to become the seat of irritations of a specific kind—as of cancer—which appeared to be previously held in check by the play of the healthy sympathies. Yet, although the female is more liable to disease at this time, it would not seem from the results of statistical inquiry that the mortality is increased.

It is obvious, then, that the state of the uterine function must be an important object of inquiry in many of the diseases to which the sex is liable; that when the catamenia are present, the secretion must not be officiously interfered with; and if modified, either owing to the proper periodical irritation having been arrested, or to the flow occurring in too great quantity, appropriate measures for altering these conditions must be had recourse to.

At one time, it was universally presumed, that hysteria is occasioned altogether by the state of the uterus, and hence its name, from ὑστερα, 'the uterus,' and the German name—*Mutterkrankheit*, or 'womb disease.' It occurs, however, in man; is essentially a disease of the nervous system, and probably prevails more in females only because they possess greater mobility, and irritability of the nervous system,—doubtless often developed by the particular condition of the uterus reacting on the nervous system, but manifestly appearing—as in the male—where no such influence can be presumed. The presence of the uterine system constitutes, therefore, the main difference in the indications to be laid down for the treatment of female diseases, as well as in the mode of fulfilling those indications; and in all cases the therapeutist has to carefully inquire, whether that system be primarily or secondarily affected. In many cases of functional aberration of the uterus, he will find, that the cause is seated perhaps in the state of the general system, or in some other part of the organism, although the case may be much complicated, in consequence of the reflection of the uterine irritation to other organs.

After all, the treatment of the majority of the diseases, that attack females as well as males, must be based upon the same great general principles; the chief modifying circumstance, to be borne in mind, being, that the female is more susceptible of impressions than the male, and consequently, as a general rule, does not require the same amount of remedial agents, although the same agents may be demanded. In managing diseases that are of a sexual character, the same great modifying circumstance has to be recollected.

In the anomalies that occur at the commencement, or cessation of menstruation, the pathologist must be guided by his acquaintance with the laws of physiology and pathology, and establish his indications accordingly.

The state of utero-gestation is a point, connected with the female, which demands consideration. The various sympathetic disorders, that may arise, have to be palliated by the most gentle agents. The original cause being seated in the gravid uterus cannot, of course, be removed, and palliation alone remains. No violent medicinal agents can be prescribed without hazard. Powerful excitants are especially objectionable; and hence the hot bath cannot be used with impunity. Anything, that interferes with the due nutrition of the fœtus in utero, or that can give occasion to uterine contraction, is obviously improper. It is necessary, also, to bear in mind, that the blood of the pregnant female usually presents the buffy coat, or that appearance, which has been so generally regarded as the universal product of inflammation as to be called the 'inflammatory crust;' and it is still maintained by some, that this crust on the blood of pregnant women only appears, when inflammatory irritation exists. Certain, however, it is, that we witness it, when there are no other signs of inflammation. When the crust occurs in inflammation, it appears to be owing to the vitality of the blood being exalted, so that it is longer in coagulating, and time is thus allowed for the subsidence of the red globules to the bottom of the vessel. The fibrine, devoid of red globules, then forms the upper crust or stratum, which is the *buff*. In like manner, it may be understood, that under the new draughts, which are indirectly made from the maternal blood, during pregnancy, its vitality may be exalted, so as to give rise to the phenomenon in question. As a general rule, the pathologist regards the appearance of the crust on the blood, as a strong proof of the presence of inflammation; and, when he would otherwise have remained in doubt, is encouraged, by this sign, to repeat blood-letting. In pregnancy, such an inference from the appearance of the blood drawn might, for the reasons stated above, be erroneous. In many parts of this country, it is not unusual for a female to be bled five or six times during the period of pregnancy:—often three or four times; and if blood should not have been drawn, and any unfortunate event should occur, it is apt to be ascribed to a neglect of this fancied prophylactic. It is strange that a process, which every one would readily admit to be natural in the animal, and to require no remedial means, should be regarded as a pathological condition. The notion has, however, been encouraged by some of the medical profession of no little celebrity, especially by Sauvages, who places pregnancy in the order *Intumescentiæ* of his Nosology, and by Linnæus, who ranges it under *tumidosi* (morbi).

During the period of nursing, the practitioner has to attend to another circumstance; viz., that the action of his medicinal agents may not be confined to the female; for the infant at the breast may be affected likewise. Absorption is active, in consequence of the constant secretion from the mammæ, and certain substances may, therefore, be taken up, in sufficient quantity to affect the child injuriously.

3. ORIGINAL CONFORMATION.

There are many circumstances, connected with original conformation, which exert a modifying influence both hygienically, and therapeutically. Singular as it may seem, it is indubitable, that from the moment of a fecundating copulation, the new being is impressed with an impulse, which gives occasion to such a formation as may predispose the offspring, at some period of its existence, to a disease that affected the male or the female parent. In this way, a conformation may result, which may favour the development of consumption, apoplexy or scrophula, under the action of adequate exciting causes, at certain ages. Hence, it is, that we find so much difference in the *constitutions* of different persons. The constitution of an individual is the organization proper to him; and he is said to have a strong, or a delicate, a good, or a bad constitution, when he is apparently strong or feeble,—usually in good health, or liable to repeated attacks of disease. The varieties of constitution are, therefore, as numerous as the individuals themselves. A strong constitution is considered to be dependent upon a due development of the principal organs of the body; on a happy proportion between those organs; and on a fit state of energy of the nervous system; whilst a feeble or weak constitution results from a want of these postulates; but it is obvious, that our knowledge on this matter must be somewhat limited, although, by a careful examination, we may be able to appreciate or rather to approximate it.

It is daily observed, in our intercourse with man, in a state of health, or of disease, that some persons possess much more irritability or impressibility than others. This irritability or impressibility is mainly seated in the nervous system, and through it every tissue of the body may be affected, by virtue of the contractility or excitability which it possesses.

Men certainly have very different degrees of nervous energy; and of susceptibility to impressions; and consequently great diversity, in the degree to which they are predisposed to disease, and in the action of remedies. Persons of very great nervous susceptibility are sensibly alive to atmospheric vicissitudes; have the *Cœnæsthesis*, or 'common feeling,' of the Germans, extremely acute; are languid, listless, and depressed in a lowering atmosphere; buoyant, and elastic, or 'corky'—to use the language of the 'trainers'—when the air is dry and serene. We see the same variety in the way in which powerful emotions, or powerful impressions of the senses, affect different individuals. Some persons faint on the slightest shock made on any of the senses; others are thrown into convulsions by causes, which, in others, again, would excite no perceptible emotion. The over-excitement of a nervous individual concerns us materially, in the application and effects of our therapeutical agents. With such individuals, the slightest cause may produce fever, owing to the irritation of the nervous system extending to the vascular system, and causing in it augmented action. Usually, the febrile irritation, thus induced, is only ephemeral; but if there be any part of the capillary system, owing to obstruction, or morbid derangement, strongly predisposed to assume the inflammatory condition, such a condition may be induced by the force with which the blood is propelled by the heart and arteries. The circulatory system is not *directly* influenced by the brain or spinal marrow, but it is so *indirectly*. We see this in the effect of emotions. The heart leaps with joy; and under the influence of certain passions its actions are hurried and unequal. Nay, the effect extends even to the small vessels, —to those by which secretion is operated in the glandular system. At the sight of a cherished article of food, the salivary glands secrete so rapidly as to cause the 'mouth to water,' and the saliva to be projected from it.

It is an important principle, not to be lost sight of in Therapeutics, that the condition of the circulatory system is largely influenced by that of the nervous system; and it is especially important to bear this in mind in the management of febrile and inflammatory diseases. If blood-letting be pushed to a very great extent, in such cases, it will induce irregularity of action, and irritability of the nervous system, and in this way local determinations may be, and often are, induced by the very means employed to obviate them. This effect of copious loss of blood is instructively exemplified in uterine hemorrhage. A female, after delivery, may be reduced to death's door by the profuse discharge of blood. She may be almost pulseless, pale, and exanguious; and yet, in the course of a few hours after she has rallied, the most violent determination may take place to the head—as indicated by intolerable cephalalgia and violent throbbing of the carotid, and temporal arteries;—a state induced by the irregularity above described as apt to be engendered by that irritability of the nervous system, which follows a profuse discharge of blood. In such a case, farther blood-letting obviously cannot be indicated. The irritability of the nervous system must first be allayed; and accordingly, the author has found the most decided advantage from the use of opium administered in such a dose, and in such a form, as to ensure the speedy production of its full sedative influence. When this begins to be exerted, the activity of the cephalic circulation gradually yields; and in a short time the whole mischief disappears. If blood-letting be had recourse to in such a case,—even to a moderate extent, and it could not be carried far in this reduced state of the system, —it is calculated to augment the very pathological condition which it was intended to remove. The advantage attending a union of copious bleeding with sedative doses of opium can thus be readily appreciated. The abstraction of blood reduces the amount of stimulus in the sanguiferous system, whilst the opium keeps down the excitement of the nervous system.

In particular diseases, the nerves are remarkably susceptible to impressions. In neuralgia faciei, the slightest motion of the muscles—the least breath of air—induces the most excruciating torment; and in hydrophobia, the distress and horror are chiefly occasioned by the impression of certain objects on the organ of sight. Some persons, again, suffer much more from pain than others. This is the case with different animals, and it is equally so with different men. The idea, that the beetle, when trod upon, feels as much as the giant when he dies, is poetical, but probably untrue. Some persons are thrown into the greatest nervous distress—the most intolerable anguish—by the application of a blister; and it is well known, that all do not bear surgical operations equally well. This is doubtless greatly dependent upon organization, although it may be modified by habits of endurance or the contrary. The state of the mind exerts a powerful influence in this respect. The religious fanatic, and the martyr to political excitement, have exhibited a resistance to physical agents almost incredible.

The condition of the nervous system can never be wholly disregarded by the therapeutist. Whenever it is morbidly impressed, the operation of medicines is interfered with; and regular physiological actions may be modified. We see this last effect exhibited in the parturient female. Labour may have been proceeding in the most favourable manner, but if anything should interfere with the attendance of the practitioner who has been expected, and another should present himself; and still more, if the latter should have an unprepossessing appearance, the pains may subside, and the delivery be greatly retarded; whilst if the accoucheur, in whom the female had reposed her confidence, had presented himself, the termination might have been as much facilitated. Dr. A. T. Thomson gives the following anecdote as illustrative of the control of the mind over the operation of medicines, where the whole effect must obviously have been induced through the nervous agency modifying the functions of the organs concerned. A lady was labouring under an affection of the bowels, attended with severe pain and the most obstinate costiveness. She was bled; the warm bath, and fomentations were frequently resorted to; and purgatives and various anodynes were freely administered, but without the least effect upon the bowels, and without either sleep, or any diminution of pain ensuing. At length, the physician in attendance was informed that she had expressed her conviction, that her usual medical attendant, who was in the country, alone understood her constitution, and was the only person who could relieve her. This gentleman was accordingly sent for; and although no change, either of measures, or of medicine, was resorted to, the bowels were quickly moved; sleep, and a cessation of pain followed, and in a few days the patient was convalescent. He further remarks, that he has witnessed frequent illustrations of this influence of mind, in modifying the effects of medicines, in the treatment of gonorrhœa, contracted by married men; and also by young men, possessed of a high feeling of moral rectitude. The anxiety of such persons to be speedily cured occasions the mind to be constantly directed to the seat of the disease; and more or less erethism is thus induced there, which renders the cure difficult. Dr. Thomson thinks, that 'a vascular fulness of the mucous membrane, and a state resembling chronic inflammation' are thus superinduced, which resist the influence of medicines, that would readily cure the disease in those in whom it was a matter of less anxiety, and little mental reflection. It is obviously, therefore, of moment, in all affections, particularly in those of an inflammatory character, that the mind should not be permitted to brood over the malady; and that every endeavour should be made to withdraw the nervous influence from the part affected, so far as this can be done with propriety. It is in this way, that revulsive applications exert a portion of their beneficial agency. They not only excite the parts to which they are applied, so as to break in upon the morbid catenation elsewhere existing, but they attract the attention; and the nervous influx, which would otherwise be directed towards the suffering organ, is directed towards the part artificially irritated.

Much stress has been placed on the influence of temperament in a pathological as well as therapeutical point of view. The subject of the temperaments, usually admitted, belongs to physiology. (See the author's *Human Physiology*, 4th edit. ii. 567, Philad. 1841.) The *sanguine;* the *bilious* or *choleric;* the *melancholic* or *atrabilious;* the *phlegmatic, lymphatic* or *pituitous*, and the *nervous* are generally received and described by writers; but if we attend to their reputed characteristics, the imperfection of their definition and demarcation is obvious; so imperfect, indeed, are they, that it is very rare for us to meet with an individual, whom we could unhesitatingly refer to any one of them. They are likewise susceptible of important modifications from climate, education, &c., and may be so combined as to constitute innumerable shades. The man of the strongest sanguine characteristics may, by misfortune, assume all those, of a mental character particularly, which are looked upon as indexes of the melancholic or atrabilious; and the activity, and impetuosity, ascribed to the bilious temperament, may, by slothful indulgence, be converted into the lymphatic or phlegmatic. All these temperaments acquired their names from a fancied predominance of certain systems, which so tempered the different functions as to communicate certain evident characteristics. In a therapeutical consideration, they do not demand much attention, except perhaps so far as regards the two opposite—the *sanguine*, and the *melancholic;* and perhaps the *nervous*. The first of these is presumed to be dependent upon a predominance of the circulatory system; and hence is considered to be characterized by strong, frequent, and regular pulse; ruddy complexion; animated countenance; good shape, although distinctly marked; firm flesh; light hair; fair skin; blue eyes; nervous susceptibility, attended with rapid *successibilité*, as the French term it,—that is, a facility of being impressed by external objects, and of passing rapidly from one idea to another. On the other hand, in the melancholic temperament, the vital functions are considered to be more feebly or irregularly performed; the skin has a deeper hue; the countenance is sallow, or sad; the bowels are torpid, and all the excretions tardily accomplished; and the pulse is hard and habitually contracted. In the nervous temperament, again, the susceptibility of being acted upon by external impressions is unusually developed. It is characterized by small, soft, and, as it were, wasted muscles; and generally by a slender form, and great vividness of sensation.

Such are the characters ordinarily assigned to these temperaments. Many of them are fallacious, and but few need be borne in mind in therapeutical investigations. As a general rule, it certainly would seem, that persons of strong sanguine characteristics have the nervous system more impressible; the body more predisposed to inflammatory action, and the vessels less protected by the tissues in which they creep, and hence they are more liable to obstructions, as well as to hemorrhage by rupture or transudation; and it is manifest, that in such an organization antiphlogistics may be more demanded, and stimulants ought to be employed with more caution, than in the melancholic. Again, the possessor of the nervous temperament may demand modifications of management, both hygienical and therapeutical, which may not be suggested in those of any of the other temperaments. After all, however, we cannot deduce much instructive matter, for our practical guidance, from the study of this topic; nor does it seem to the author, that the doctrine of the temperaments in any of its relations—physiological or psychological—hygienical or therapeutical—is worthy of the consideration that has been bestowed upon it. In Therapeutics, the nature of the diseased action going on in an organ is the great object of study; and if our thoughts are distracted from this, and directed to temperaments or tendencies, we may often be greatly misled. Some years ago, the author was requested to visit a lady, for the first time, in the absence of the regular physician, who had long attended her, and had become, what is called, 'acquainted with her constitution.' She was labouring under profuse metrorrhagia, which had continued for some time, and had completely prostrated her; she was deadly pale; lips blanched; pulse scarcely perceptible; and every evidence present, that the hemorrhage was not continuing from activity of vessels; or, at all events, that the idea of activity must be laid aside in the treatment, and the powers of life be supported, or otherwise she would sink. The uterus was in an unimpregnated state. The usual means with the tampon were adopted successfully, so far as regarded the immediate flow; and a tonic system of medication was recommended, under which the hemorrhage did not recur during the day. In the evening, the family physician arrived, who, finding her in a comfortable situation, and evidently improving, discontinued the tonics, under the apprehension, from his knowledge of her sanguine temperament, that violent reaction and consequent mischief might ensue; but in the night he was called up, owing to the alarming recurrence of the hemorrhage, and was glad to have recourse to the management, which had previously proved successful; under which she ultimately recovered, and since that period—eighteen years ago—has had no return of the disease. In this case, a 'knowledge of the constitution' was likely to have been attended with disastrous results. The diseased condition is, indeed, the only point to which attention has to be directed; and it is the only one that can, in general, fall under the personal observation of the physician, in the mode in which the profession is regulated in England. The apothecary is there the family-practitioner, and the physician is only called in consultation, so that the chief part of his practice must necessarily occur in persons, with whose constitutions he has had no opportunity of being previously acquainted.

Temperament is conformation, but *Idiosyncrasy*—or the peculiar disposition, which causes an individual to be affected by extraneous bodies, in a way in which mankind in general are not acted upon by the same agents—may be acquired, and when once it has been so, it is apt to continue, and frequently does so throughout the whole of existence. The author possesses a singular idiosyncrasy of this kind. If a piece of thin biscuit, or oaten-cake, be broken in his presence,—nay, the idea alone is sufficient,—the muscles, that raise the left angle of the mouth, contract irresistibly. It is obviously of moment, that the practitioner should be acquainted with all idiosyncrasies or peculiarities, and so far the notion of 'knowing the constitution,'—which is apt to be used to the prejudice of the young practitioner, or of any except the accustomed medical attendant—carries reason with it. But it is the duty of the patient to put the practitioner in possession of the fact of such peculiarity, so that he may be enabled to guard against it, and not take that for morbid, which is the effect of simple idiosyncrasy.

By virtue of these peculiarities medicines will often produce effects diametrically opposite to those they ordinarily exert. The author knows a gentleman, whom opium purges, yet this drug is usually administered to check inordinate action of the intestinal tube. Mr. Chevalier gives the case of a lady, who could not take powdered rhubarb without an erysipelatous efflorescence showing itself, almost immediately afterwards, on the skin; yet, what is singular, she could take it in the form of infusion with perfect impunity. It is impossible for the physician to detect these peculiarities by any signs. His information has to be wholly derived from the patient. But when once acquired he is expected to retain it; and, strange as it may seem, all confidence in the practitioner is at times annihilated, because he did not recollect that oil of peppermint, or some other trivial agent, was in the habit of disagreeing with his patient. It is apt to be regarded as an evidence that he did not attend sufficiently to the constitution, and the inference, is drawn, that without this, his endeavours could not have secured the full amount of success, whilst his inattention might have been productive of bad effects, owing to the irritation that might have been induced, by the development of this sympathy, in a frame perhaps already too much disturbed by morbid influences.

There are very few functions of the body that are altogether free from idiosyncrasies. An acquaintance of the author cannot be present where ipecacuanha is being powdered, without the most violent catarrhal symptoms being produced; and many similar cases are recorded. The smell of the callicanthus is so disagreeable to another as to be almost intolerable. Pope Pius VI. had such an antipathy to musk, that on an occasion of presentation, an individual of the company having been scented with it, his Holiness was obliged to dismiss the party almost instantaneously. These are idiosyncrasies or peculiarities connected with smells, which are agreeable to the generality of mankind. On the other hand, by some, offensive smells are preferred. The author knew a lady, who always perfumed her snuff with assafœtida; and Louis XIV. is said to have preferred the smell of the urine of the cat to that of the rose. Some persons, again, cannot take peppermint, and with many, opium disagrees, producing the most intolerable headache, nausea, and vomiting, and exciting no anodyne effect whatever. Dr. Thomson refers to the case of an individual, who was always attacked with syncope when he took the smallest dose of calomel. But peculiarities of this kind are innumerable, and the practitioner ought to be put in possession of them, otherwise disagreeable results may take place; the economy may be disordered, or effects, opposite to those which the article usually induces, may follow.

The different impressibility of the nervous system in different individuals is often exemplified in practice in the effect produced upon the circulation at the appearance of the physician. The pulse of a delicate female, under such circumstances, is often quickened 20 or 30 beats in the minute;—a fact which the physician should bear in mind, or he might ascribe that to disease, which is the mere effect of idiosyncrasy, or inordinate impressibility. In some persons, the pulse is unusually slow. The ordinary number of beats of Napoleon's was 44 in the minute; the author knew one 36; and Lizzari refers to one, which did not number more than 10: but it is *possible*, that in this case there might have been intermediate beats unperceived by the physician. On the other hand, some individuals have the pulse much quicker than ordinary. Seventy beats in the minute is about the average with the healthy male; but sometimes the number in health is as high as 90 or 100. The pulse of the aged is generally more frequent than that of the adult, and is irregular, or intermittent, but it is occasionally, unusually frequent and regular. A change of this kind occurred to a valued friend of the author, who had filled the highest office in the gift of his countrymen. Until about the age of 80, his pulse possessed the usual character appertaining to that of the aged; but, for some years before his death, it became quicker, beating nearly 90 in the minute, and more regularly than it had done. During early childhood, the same intermittent and irregular character exists in health, but the pulse is faster than in the adult. As a general rule, at birth the number of pulsations is from 130 to 140; at one year, 120; at two years, 110; at three years, 90; at puberty, 80; at the adult age, 70; and in old age, something higher. In the female, the pulse is on the average from 5 to 10 beats quicker than in the male.

All these circumstances have of course to be borne in mind in investigating any case of disease. But owing to individual peculiarities, it becomes at times extremely difficult to pronounce upon the existence of a morbid condition from single symptoms,—as from the pulse; more especially from its degree of quickness or slowness, inasmuch as we are not always acquainted with the number of beats in the state of health. It is partly on this account, that Celsus termed it "*res fallacissima*," yet, it has even been made the ground of discrimination in a case of suspected insanity, and by an illustrious native of this country, whose transcendent abilities were at times obscured by his unbounded enthusiasm, and too prolific imagination. In counterfeited insanity, Dr. Rush remarks, the pulse will be natural; in real insanity it is generally more excited than in a state of health; and this diagnostic Dr. Cooper has introduced into his collection of '*Tracts on Medical Jurisprudence*,' as a fixed and invariable law; to which, at least, he has not attached any doubt or exception. "The knowledge of this fact," adds Dr. Rush, "has once been applied with success in the administration of the criminal laws of the United States. One of the two men who were condemned to die for treason, committed against the general government in the western counties of Pennsylvania in the year 1794, was said to have lost his reason after sentence of death had been pronounced upon him. A physician was consulted upon his case, who declared his madness to be feigned. General Washington, then President of the United States, directed a consultation of physicians upon his case. Dr. Shippen, Dr. Samuel P. Griffitts, and myself were appointed for that purpose. The man spoke coherently upon several subjects; and for a while the state of his mind appeared doubtful. I suggested the propriety of examining his pulse—it was more frequent by twenty strokes in a minute, than in the healthy state of the body and mind. Dr. Shippen ascribed this to fear. I then requested, that the pulse of his companion, in guilt and fear, might be felt. It was perfectly natural in frequency and force. This discovery induced us to unite in a certificate, that the man, who was only supposed to be mad, was really so; in consequence of which his execution, as well as that of his companion, were suspended for two months; in which time the popular clamor for their lives so far subsided, that they were both pardoned by the executive of the United States." This is perhaps the *ne plus ultra* of medical philanthropy,—rather than of science.

From all that has been said, it is manifest, that idiosyncrasy must have much power in modifying the operation of medicines; and that it is consequently important for the practitioner to be aware of this; and it may not be amiss for him to make specific inquiries, where he wishes to administer such drugs as are apt to disagree with certain individuals;—of which opium and its preparations, and calomel, are perhaps the most prominent.

4. HABIT.

By this is understood an acquired disposition in the living body, become permanent, and as imperious as any of those primitive acts, which have been also, in another sense, denominated *habits*. When a function is over and over again exerted to the utmost extent of which it is capable, both as regards energy, and activity, or is exerted beyond the ordinary extent, it becomes more and more easy of execution; the organ is better adapted for its production; and, it may become so habituated to this over exertion, that a real want may be engendered,—a 'second nature,'—and the individual may feel uncomfortable, unless the organ is subjected to the accustomed action. In the same way, by habit, the action of an organ may be diminished, until ultimately it is but little adapted for full power. The knowledge of these facts has led one of the most gifted and ingenious naturalists of the present time—M. De Lamarck—to affirm, that the habits of an animal are not dependent upon its organization; but that, on the contrary, its habits, mode of life, and those of its ancestors have, in the succession of ages, determined the form of its body, the number and condition of its organs, and the functions and the faculties it enjoys:—a position, which he has supported with much plausibility, and at the same time with much that approximates to the *reductio ad absurdum:* as, for example, where he takes the case of reptiles, which, as well as other vertebrated animals, in his view, had originally, according to the great plan of organization, four paws attached to the trunk. Serpents must consequently have had four; but having assumed the habit of creeping along the ground, and of concealing themselves in the grass, their bodies, owing to perpetual efforts at elongation, to enable them to pass into narrow spaces, acquired an unusual length, in nowise proportionate to their thickness. Paws would have been quite useless. Long paws would have interfered with their creeping, and very short paws would have been but ill adapted for moving the body. Hence, the want of employment of these parts being constant, they gradually disappeared; although, says De Lamarck, they may have originally entered into the plan of organization of animals of their class. But, although this distinguished naturalist carries the effect of function on organization to an extent, which cannot be maintained; it is certain, that the habitual exercise of an organ does add to its development, within certain limits, whilst inaction gives occasion to its impoverishment. We have this signally exemplified, if we restrict an animal to diet of a different character from that to which it has been accustomed; or to one foreign to its nature. In birds of prey, the digastric muscle—which is strong in the gallinaceous bird—has the bellies composing it so weak, that, according to Sir Everard Home, nothing but an accurate examination can determine its existence. But if a bird of this kind, from want of animal food, be compelled to live upon grain, the bellies of the muscle become so large, that they would not be recognized as belonging to the stomach of a bird of prey. Mr. Hunter kept a seagull for a year upon grain; after which he found the strength of the muscle greatly augmented. This wondrous adaptation of structure to the kind of food, which the animal is capable of obtaining, is likewise elucidated in the cases of the South American, and the African ostrich. The former is the native of a more productive soil than the latter; and accordingly the gastric glands are less complex, and numerous, and the triturating organ is less developed. It is owing to the effect upon the body of long-continued action, that old and inveterate habits cannot be suddenly broken in upon with impunity. Hence, issues, or other discharges must be gradually checked prior to total occlusion; otherwise, the irritation, and consequent afflux may be directed to other and important organs, which may be, at the time, disposed to assume a morbid action.

In like manner, where a person has been in the habit of daily indulging in the unmeasured use of spirituous liquors or of opium, we cannot safely withdraw, at once, the accustomed stimulus. The nervous system, habituated to stimulation, totters, if excitants be withdrawn; and delirium tremens, with all its horrors, almost surely supervenes. In times of spreading sickness, such sudden and total change of inveterate habits, no doubt, adds greatly to the extent of the calamity. The drunkard becomes alarmed; abandons his stimulant; and, under the depression that follows, readily imbibes the morbific influence; and sinks a victim to incautious reformation.

The effect of medicines on the frame is much influenced by habit. As a general rule, continued use detracts from their power. This is strongly shown in the case of opium. Instances are related, in which two drachms, or one hundred and twenty grains of solid opium, or five fluid ounces of laudanum, have been taken in twenty-four hours; yet before the habit was induced these persons could not have taken as many grains without danger. But although this habit of endurance or resistance has been acquired in the case of opium, it does not follow that the system, thus rendered obdurate to it, will resist large doses of other narcotics. Notwithstanding these extraordinary quantities of opium may be swallowed with impunity, the same individual may be affected with considerable facility, provided another narcotic be substituted. In like manner, if a person has been habituated to the use of aloes as a cathartic, it may altogether lose its effect; yet if we change the special irritant, or have recourse to another cathartic—castor oil, or sulphate of magnesia, for example—catharsis may be produced by an ordinary dose. It does not therefore follow, that the sensibility of the mucous membrane of the intestinal canal becomes blunted in these cases. It merely loses its impressibility as regards one irritant; whilst it may be equally susceptible of irritation from every other irritant of the class.

According to this general effect of habit, it would follow, that the second dose of a cathartic ought to be larger than the first, provided it be administered within such a period, that the influence of the first dose continues to be felt; and it is the usual practice with the physician to direct the after dose to be larger; but there are some cathartics, which appear to differ in their action upon the mucous surface so as to render it more impressible,—many of the salines, for example. This effect has long been ascribed to the Cheltenham water. It would seem, too, that the constitution, so far from becoming reconciled to lead by habit, is rendered more and more sensible to its irritation. Emetics also frequently act more powerfully by repetition. Dr. Cullen affirms, that he knew a person so accustomed to excite vomiting on himself, that the one-twentieth part of a grain of the tartrate of antimony and potassa was sufficient to produce a convulsive action of the parts concerned in vomiting. This difference as to the effects of agents by repetition we observe in disease. In certain cases, after the system has been once morbidly impressed, it is ever afterwards unsusceptible of the same mischief; in others, it is less susceptible; whilst in others again, it is rendered unusually impressible. The last effect is signally observable in the case of miasmata—those at least which give rise to intermittent fever. A person, who has once suffered under a pernicious, or severe, or even ordinary intermittent, requires a less dose of the malaria to reproduce the disease, than was required to occasion the first attack; and, at times, the nervous system becomes so impressible, that a chill is experienced whenever the individual enters upon a soil which is exhaling the miasm. Persons so extraordinarily impressible have, indeed, been used to indicate the existence or non-existence of malarious exhalations in given localities. In the seventy-second number of the 'Edinburgh Review,' a writer pronounces several districts surrounding St. James' Park, in London, to be unhealthy, owing to such exhalations, as tested in the mode just mentioned;—an officer who had suffered at Walcheren being the *miasmometer!*

It may be laid down then, as a general rule, that remedies lose their effect by habit; and this is often strikingly the case with tonics; yet if another tonic be substituted for a day or two, and the former be afterwards resumed, it will produce all its previous effects. Although, however, this is the general rule, it admits of numerous exceptions.

5. CLIMATE.

The capability of existing in all climates is one of the attributes of humanity. Man is however considerably modified in his physical and mental characteristics by situation. The temperate zone appears to be best adapted for his full development; and it is there, that the greatest ornaments of mankind have existed, and that science and art have flourished in exuberance; whilst in the torrid regions, the sensibility is over-excited; physical and moral energy is obtunded; and the native of the temperate zone, who has entered them full of life and buoyancy, has quitted them, after a few years' residence, listless, and shorn of his proudest characteristics. (See the author's *Elements of Hygiène,* p. 51, Philad. 1835.) The frigid zone, on the other hand, is equally unfavourable to mental, and corporeal development; the sensibility being blunted by the rigors of the climate. But the effect of locality is perhaps most signally exemplified in the *crétin* and *goîtreux* of the Valais, and of situations at the base of lofty mountains in almost every part of the globe; as well as in the inhabitants of our low countries, who are constantly exposed to malarious exhalations, and bear the sallow imprint on their countenances. The whole of the circumstances connected with the causation of endemic disease exhibit the powerful influence of locality in the way of morbid impressions; and the outward conformation of the natives of different countries is an equal exemplification of its physiological influence. It is owing to such climatic modification, that we are enabled to distinguish the Frenchman from the Spaniard, Italian and Portuguese, although belonging originally to the same great Romanic stem: as well as to discriminate the different branches of the Teutonic race—the German, Dutch, and the Scandinavian—from each other.

As regards the disposition to disease of particular organs, induced by climate, it may be laid down as a general truth, that hot climates dispose to bilious complications. The heat occasions erethism in the whole dermoid system;—hence diarrhœa, dysentery, cholera morbus, &c., dependent upon irritation or inflammation of the lining membrane of the intestines; and this irritation, being propagated by continuous sympathy along the biliary duct to the liver, that organ is excited, sometimes inflamed, and in this way disease of the liver becomes induced by the influence of heat. The mode adopted at Strasburg and Metz, for enlarging the liver of the goose, is signally elucidative of this subject. (*Elements of Hygiène*, p. 49.) On the other hand, in cold climates, there is a greater tendency to inflammation of the mucous membrane of the air passages;—the irregularity in the cutaneous and pulmonary transpirations giving occasion to local excitement in the bronchial mucous membrane, which is not always restricted to that texture, but in favouring habits may extend to the substance of the lungs, so as to develope pulmonary consumption. Hence, the effects of change of climate—especially the removal from a temperate to a torrid region, or conversely—become an interesting topic of inquiry to the physician in a hygienical as well as therapeutical point of view. The author has elsewhere shown, that owing to the great nervous susceptibility induced by the heat of torrid climes, such climes are unfit for those that are predisposed to mania, and to head affections in general; whilst they are, *cæteris paribus*, the best that could be selected for such as are predisposed to pulmonary consumption, although most fatal to the same class of patients when the consumption has become confirmed.

The circumstances, that modify the physiological and pathological condition of man, necessarily modify, also, the mode of fulfilling therapeutical indications which might seem to be obvious. The well-instructed physician readily detects those differences, otherwise it would be necessary, that every student should receive his education in the country where he has to practise his profession. The practitioners, who are destined to exercise their calling in British India, receive their education in the mother country, whilst Philadelphia sends her alumni to practise in Maine, in Louisiana, and indeed in every part of the globe to which the interests of the nation, or the thirst of gain leads the hardy and venturous citizen. The principles of the science are alike everywhere, and but slight observation is requisite to guide the properly instructed mind to the appreciation of climatic differences of every kind.

Climate has some influence, but not a great deal, in modifying the action of remedies. Dr. Harrison found, that narcotics produced more effect in Naples, than in England. He instances the extract of hyoscyamus, which, in doses of three grains, three times a day, at Naples, produced temporary amaurosis, or nervous blindness, that disappeared and recurred on the alternate suspension and administration of the medicine. This was observed in two patients, who had often taken similar doses of the same remedy, in England, without any unpleasant result—an effect which Dr. Harrison refers to the increased nervous susceptibility or impressibility, induced by the warmer climate. It might be imagined, that a source of fallacy existed in the circumstance of the Italian extract being more powerful than the English; but in answer to this Dr. Harrison remarks, that the medicine, which he administered in Italy, was procured from London. The same gentleman found, moreover, as a general rule, that the doses of medicines, as ordered in England, were too large for the climate of Italy. The rule indeed may be extended, and it may be laid down, that remedies act more powerfully, or produce the same effect in smaller doses in hot climates, owing to the greater nervous susceptibility of the residents in such climates. Still, to this there are numerous exceptions. In referring to the subject, Dr. Thomson remarks, that "it does not always follow, that the doses of medicines require to be reduced in warm climates; on the contrary, in India, a scruple of calomel and a grain of opium are frequently administered, and repeated at short intervals, after depletion in dysentery;" and he adds,—what must amuse the residents of many of the malarious districts of this country, and especially of the valley of the Mississippi,—that "but few physicians would venture to prescribe this active remedy, in such large doses in this climate,"—in other words, in temperate climates. The truth is, that the action of calomel is but imperfectly understood. The French speak with horror of the doses administered by the English; and in some parts of this country they are equally surprised at the small. doses in which it is employed in England. The author well recollects the tone in which a distinguished French army physician spoke of the hardihood of the English physicians in prescribing three grain doses of calomel; yet there are practitioners in this country, who give it in the dose of one hundred, or one hundred and fifty grains, and even more. These immense doses do not produce an increased purgative effect in a ratio with the dose. On the contrary, two or three grains may be actively cathartic, whilst twenty may not produce more or as much effect. After bleeding, especially, absorption is active; the calomel speedily attains the circulation, and is given off by the cutaneous exhalents, as is evidenced by the effect produced upon a gold watch worn by the patient. Such appears to be the effect of a very large dose, even when blood-letting has not been premised, whilst a small dose irritates—without there being the stimulus of quantity to induce its absorption—and has a cathartic agency. In this way, a large dose of calomel may defeat the object of the prescriber if he wishes to produce catharsis, and by undergoing absorption and coming in contact with every organ, it may excite a new action in the whole secretory system; and even if we admit, that when given in unusual quantity, it is altogether harmless, the superfluous amount must be a waste of the article.

In all the cases, in which such large doses of calomel are administered, the practitioner is led to persuade himself, that the climate requires them. But this argument is often fallacious, and it may be employed to bolster up any plan, that has received the approbation of a part or of most of the profession, too often, perhaps, without sufficient examination. It has been a common opinion, that in our ordinary bilious fevers, copious blood-letting, and the most active and irritating cathartics are imperiously demanded; and the practice founded upon this belief was at one time universal; so much so, indeed, that no other was adopted extensively until of late years; but since a greater degree of attention has been paid to the condition of the mucous membrane in these affections, and a better philosophy has suggested, that whilst we are keeping the different external sensitive surfaces free from all irritation, we ought not to be perpetually irritating the internal dermoid prolongation, practitioners have been induced to abandon the constant use of irritating cathartics; to keep the digestive canal free by the use of mild cathartics, which remove the morbid secretions as they are formed; and, by the proper use of sedatives —of which blood-letting is almost the only one—and of refrigerants, to reduce the inflammatory excitement. By such a plan —and *experience* can equally be adduced in its support—the ordinary bilious fevers of our country will be found to yield more satisfactorily, than under the mixed sedative and irritating treatment, which was formerly universal, and still prevails too extensively. It is obvious, too, that where one system of medication is exclusively employed, it is impossible to draw any deductions from comparison, and we are not justified in affirming, that climate requires one system more than another until an equal trial has been made of both.

The therapeutist has opportunities for witnessing the modifying influence of climate, when individuals pass from a torrid to a temperate or frigid region, and conversely. If the removal has been from a hot to a cold climate, the impressibility is diminished, and larger doses of medicines are necessary to produce the wonted effect; if from a cold to a hot, the impressibility is augmented; smaller doses are necessary; and, owing to the same cause, less powerful excitants produce fever; and stimulating drinks have to be carefully avoided. "With respect to inuring foreigners to a country," says a modern writer on Therapeutics, (*Bégin*,) "we are to preserve their organs against the impression of the climate, whose influence has been studiously examined. Thus, the inhabitants of the south, when transplanted into cold and damp climates, should keep their bodies warmly clothed, to preserve themselves from bronchitis and pneumonia, to which they become much exposed; they are to assume gradually the use of warm and somewhat stimulating drinks. A substantial diet, consisting of animal food, with the moderate use of spirituous liquors, are the precepts to be observed in passing from a warm to a colder climate. Complete sobriety, and the use of vegetable food, are, on the contrary, necessary for those who pass from a northern to a southern latitude. In marshy places, abounding in simple or pernicious intermittents:—in those climates, that are devastated by plague, yellow fever, cholera morbus, or dysentery, it is necessary to shun the action of the deleterious miasmata, to approach only by degrees the *foyers* of infection, to avoid intemperance of all kinds, and every excess, which, by increasing their susceptibility and irritating the digestive organs, evidently dispose to endemic diseases." These last recommendations are equally applicable where the change of residence has been from a warmer to a colder region, even where there may be no endemic disease. It has been a matter of repeated observation, that the habit, acquired during a sojourn of some duration in any climate remains for some time after a removal to one of opposite character. Dr. Edwards has shown this as regards the *physiological* performance of certain functions, and it has been long noticed pathologically in the watering and other places of Great Britain—the resorts of the healthy and the valetudinarian from British India. Whatever complaint may attack the stranger, it is apt to assume the intermittent type, the foundation of which has been impressed on the organism by previous residence in a hot and markedly malarious region. In such cases, too, the predisposition to disease of those textures, in which erethism exists, owing to great atmospheric heat, is manifest. It is in individuals thus circumstanced, that M. Bégin recommends the tolerably free use of spirituous liquors—a measure, to say the least of it, doubtful, and in the author's opinion, more likely to produce irregularity of action, than any regimen that could be advised,—as it is impossible to keep up the excitation uniformly; depression must therefore succeed to the stimulation, and the former in a degree proportionate to the extent of the latter. In such a condition morbific agents must necessarily impress the economy more powerfully than if all had been regularity in place of disorder.

What has been said of climate, as respects temperature, applies also to *seasons*. During the summer, the tendency of diseased excitement is to the mucous membrane of the alimentary canal; during the winter, to that of the lungs. The summer season is extremely fatal to infants in our cities, owing to a disease which consists essentially in inflammation of the lining membrane of the tube, and is produced apparently by the combined action of heat and deteriorated air. The former alone appears to be insufficient to account for its prevalence, as it is rare in country situations, where an equal elevation of temperature may prevail; and one of the most certain modes of prevention is to remove the infant from the town to the country. Dr. Rush affirms, that in the whole of his extensive practice he knew of but one case of a child being attacked with cholera infantum, where removal to the country had been adopted as a prophylactic. (See the author's *Elements of Hygiène*, p. 166.)

6. MENTAL AFFECTIONS.

We have numerous opportunities for observing the powerful effects, induced by the affective faculties on the different functions when in a state of health. All these are caused by sympathetic association with the brain; the organ secondarily affected being in a state of excitation or depression according to the precise character of the emotion. Of the therapeutical influence of different emotions, the author will have to treat hereafter; some of them being important agents in the removal of different forms of disease. The effects of one of the intellectual faculties, when inordinately exerted, on the bodily functions, are signal; and to these must be ascribed cures, that are said to have been effected by modes of management—often of the most revolting character—from time to time in vogue. In nervous, delicate, and imaginative persons, pains can be felt anywhere: sometimes, too, disease is developed in this manner; and, at others, feelings as distressing as if they resulted from actual disease.

It is through the imagination and its influence on the body, that we must explain the effects of credulity and superstition, so long employed as therapeutical agencies. At one period in the history of medical science, the materia medica consisted almost wholly of the machinery of magic. Some, indeed, as Pliny, affirm, that magic was wholly derived from medicine; but without inquiring into their precise order of precedence, it is certain, that there was a close affinity between them. The word *Ananazipta*, scrawled on parchment, was said to cool fever. *Abracadabra*, supposed by Selden to be the name of a Syrian idol, figured on an amulet, and worn round the neck, was supposed to possess the power of curing ague, and of preventing many diseases, especially when uttered in a certain form, and a certain number of times. An hexameter from the 'Iliad' allayed the agony of gout, and rheumatism yielded to a verse of the 'Lamentations.' In all these cases, the effects upon the physical ailment may have been produced through the action of the mind on the body, of which we have so many marked examples, and to some of which reference will be made presently; but, in other cases, the incantation was used, where such agency could scarcely be presumed. Cato, the Censor, for example, pretended to be able to reduce luxations, after the manner of the Etruscans and Pythagoreans, by barbarous expressions, and by magical songs;—such as *'motas vaeta daries dardaries astatutaries,'* or *'huat haut huat ista pista sista, domiabo damnaustra et luxato.'* Homer, too, affirms, that the bleeding of the wounded Ulysses was stopped by a charm, and the notion has passed down to the present enlightened age, and prevails in certain parts of Great Britain. It is referred to by Sir Walter Scott in the 'Lay of the Last Minstrel,'' and is noticed frequently in the popular poetry of the last century but one. In all these cases, however, it is probable that the enchanter employed more direct appliances to the injured part, as in the 'cure by sympathy,'—to which reference has already been made,—and that he had not therefore implicit confidence in his charms. The only remnant of the notion of charms, yet retained in medical language, is the word 'carminative,' applied to a class of medicinal substances, employed in cases, which were usually cured, or attempted to be cured, by *carmina* or incantations in verse, or to such as operated like *carmina* or verse charms.

It is not much more than one hundred years since the doctrine of curing the scrophula or king's evil by the *royal touch*, or what Browne affectedly calls *Adenochirapsologia*, was implicitly credited, and not unfrequently followed. The first English sovereign, who touched for this affection, was Edward, the Confessor, who lived in the middle of the eleventh century, and the last that encouraged it, was Queen Anne, who died about the commencement of the last century. One of the very last, subjected to the degrading mummery, was the illustrious Dr. Samuel Johnson, who, by the advice of a celebrated physician, Sir John Floyer, was carried to London in 1712, where he was actually touched by Queen Anne, but without effect. Much of the success, that often followed this practice, has been ascribed to the influence of the mind over the body; but Wiseman, one of the fathers of surgery, who lived in the early part of the seventeenth century, and who had the best opportunities for observation, asserts, that a part of the duty of the royal physicians, and serjeant-surgeons was to select such patients, afflicted with the evil, as showed a tendency towards recovery, rejecting all others; and as full confidence was placed in the effects of the royal touch, the disease was fortunately left to itself, and not officiously interfered with.

(For some well written remarks on this and other strange fallacies, see two lectures entitled "*Homœopathy and its kindred delusions*, &c." By Oliver Wendell Holmes, M. D. Boston, 1842.)

It would be as impossible, as unadvisable, to instance the various shapes, which superstition, applied to medicine, has assumed; and the hold, which it has taken on the minds of many, whose station in society, and whose general attainments, it might have been presumed, would have steeled them against the intrusion of such beliefs. The science of medicine has suffered largely from the credulity and ignorance of those who profess it, and nothing can exhibit this more strikingly than the repulsive, and ridiculous agents, which have been had recourse to as a part of the materia medica; some of which were introduced or recommended by individuals, distinguished, in their day, for superior intelligence. Thus, Bacon believed in the virtue of charms, and amulets; and Boyle thought the thigh bone of an executed criminal a powerful remedy in dysentery. Celsus advises the warm blood of a recently slain gladiator, or a certain portion of human or horse flesh, for the cure of epilepsy; and remedies of this description are said to have been actually exhibited, with success, for the cure of epileptics, in the poor-house at Haerlem, by Abraham Kaauw Boerhaave, nephew to the celebrated Hermann, and professor of medicine at St. Petersburg, who lived so recently as the middle of the last century. Amongst the specifics of Alexander of Tralles, were—the liver of a weasel freed from bile, taken for three successive days, fasting; the skull of an ass, and the ashes of clothes, stained with the blood of gladiators. Pliny recommends stones, taken from the craws of young swallows, in epilepsy. Democritus mentions, that some diseases are best cured by anointing with the blood of strangers and malefactors, and others with the blood of our friends and kinsfolk. Miletus cured affections of the eyes with human bile. Artemon treated epilepsy with dead men's skulls, and Antheus, convulsions with human brains.

It may be said, most of these degrading examples of credulous ignorance are taken from a far distant age, when physical science was yet in its infancy. It would be easy, however, to show, that, at a much later period, the same credulity reigned where it was least to be expected; and even now the pharmacopœias of certain countries, eminent amongst nations for the advanced condition of mind in many of its aspects, exhibit evidences of the like degradation. Sir Theodore Turquet de Mayerne—who was physician to James the First, Charles the First, and Charles the Second, of England, and who was the most distinguished character of his day for learning, and as a practitioner—mentions, among his remedies, the balsam of bats for hypochondriasis; remedies taken from certain parts of adders; sucking whelps; earth-worms; mummy made of the lungs of a man who died a violent death, and many other articles equally gross, and irrational. Even a century after this period of defective observation and experience, no great advancement had taken place towards a knowledge of the effects of medicines on the animal economy. The doctrines of pathology were experiencing considerable mutation; anatomy, and physiology were beginning to be vigorously cultivated; many improvements had taken place in the practice of medicine and surgery, and an immense number of fresh articles had been added to the materia medicà, of which comparatively few, however, have been since retained; yet no great improvement had occurred in the discrimination of *false* from *true* facts, so far, at least, as regards the medicinal virtues of those articles which act insensibly on the frame, and which have been commonly denominated 'alteratives.'

The lists of the materia medica of this country and of Great Britain are free from those offsprings of superstition and credulity, although they may be objectionable for the multitude of articles admitted into them. Time, however, and improved observation and experiment will rectify this evil, until—fortunately for the student, practitioner, and patient,—the list will embrace those agents only, whose virtues and applications are understood. Valuable time is frequently lost in the exhibition of a remedy of doubtful efficacy. 'Anceps remedium quam nullum,' is, indeed a maxim of by no means universal application; and the safety of the patient is often endangered by the credulity of the physician. In this way, the use of amulets, anodyne necklaces, camphor worn round the neck, &c. is objectionable. Presuming on their prophylactic or remedial powers, the wearer is apt to pass rashly into infected situations, when he would otherwise have been cautious, and, if attacked with disease, postpones the employment of efficacious remedies until the time has gone by for their successful administration.

Different bezoards, or calculi found in the stomachs of animals, and at one time generally presumed to have the power of warding off contagious diseases, were to be found in the pharmacopœias of Amsterdam, Brunswick, Spain, and Wirtemberg. A distilled water of young swallows—officinally called *Aqua hirundinum cum castoreo*—existed in the pharmacopœia of Manheim, as an anti-hysteric and anti-epileptic;—the *oniscus* or woodlouse in most of the European pharmacopœias, as a remedy in dropsy, and asthma;—the powder of the dried frog, *Bufo exsiccatus*, in the pharmacopœias of Spain, and Wirtemberg, as an anti-hydropic; the powder of the human skull in the same pharmacopœias, as an anti-epileptic; the dried liver of the mad dog, and that of the wolf, in the pharmacopœia of Wirtemberg, as an anti-hydrophobic; the Egyptian mummy in those of Spain and Wirtemberg, with the hoof of the stag, formerly regarded as a specific in epilepsy; besides many other articles equally absurd. Their retention is unfavourable to the scientific observation and induction of the people into whose pharmacopœias they are received; and it is somewhat surprising, that amidst the various pharmacopœias of German origin, that of Wirtemberg should be so far behind in rejecting the relics of ancient ignorance. (See the Preface to the Author's *New Remedies*, 3d edit. Philad. 1841.) A useful lesson may, however, be deduced from all these facts. Many of the articles are calculated to produce considerable effect upon the imagination, and thus, they may really have been productive of advantage in the treatment of disease. Who, for example, could be told, that he was about to take a pill made of the powder of the human skull, or of an Egyptian mummy, without considerable emotion? Accordingly, it will be found, that most of these disgusting agents, as well as of the various nauseous remedies, yet retained in the pharmacopœias, assafœtida, castor, skunk-cabbage, &c.,—are administered to the nervous, and the hysterical, as well as in the various affections that occur in paroxysms, to make a powerful impression on the nervous system, and thus detract from the nervous irritation already existent. In this way, we account for the action of many antispasmodics, anti-epileptics, anti-hysterics, febrifuges administered for arresting intermittents, &c.; and for the efficacy of those methods of acting on the imagination,—animal magnetism, Perkinism, &c.,—which have excited the most extravagant enthusiasm, most of which have now died away, leaving scarcely a vestige of their having been; but may be resuscitated under some other form, unless the experience of the past—by which, however, mankind are slow to profit—and the rapid diffusion of intellectual and moral light should be sufficient to choke them at their resurrection.

Perkinism, one of the most arrant delusions in the whole history of credulity, is the product of our own soil. Its proposer—Elisha Perkins, of Connecticut—is represented to have been a man of strict honour and integrity; but manifestly of an ardent imagination, and unbounded credulity. Impressed with the idea, that metallic substances might exert some agency on the muscles, and nerves of animals, and be inservient to useful purposes, as external agents, in the treatment of disease, he professed to institute various experiments, until he ultimately fancied he had discovered a composition, which would serve his purpose, and of which he formed his 'metallic tractors.' These consisted of two instruments,—one having the appearance of steel, the other of brass. They were about three inches long, and pointed at one extremity; and the mode of their application was to draw the points over the affected parts in a downward direction for about twenty minutes each time. The effects seemed to be miraculous. The whole class of diseases on which the imagination is known to exert its efficacy,—and it will be seen afterwards, that it is most extensive,—rheumatism, local pains of various kinds, and in various parts, paroxysms of intermittents, &c., yielded as if by magic. The operation was termed *Perkinism* by the faculty of Copenhagen, in honour of the inventor; and institutions were formed in Great Britain, which were regarded for a time—that is, during the existence of the delusion—as sources for the dispensation of health to suffering thousands. The following is from the report of the 'Perkinistic Committee' of London on the establishment of their institution! "Mr. Perkins," (the son of the proposer) "has annually laid before the public a large collection of new cases, communicated to him for that purpose, by disinterested and intelligent characters, from almost every quarter of Great Britain. In regard to the competency of these vouchers, it will be sufficient simply to state, that, amongst others, whose names have been attached to their communications, are eight professors in four different universities; twenty-one regular physicians, nineteen surgeons, thirty clergymen, twelve of whom are Doctors of Divinity, and numerous other characters of equal respectability. The cases published by these gentlemen in March last, the date of Mr. Perkins's last publication, amount to about *five thousand.* Supposing that not more than one cure in three hundred, which the tractors have performed, has been published —and the proportion is probably much greater—it will be seen, that the number to March last will have exceeded *one million five hundred thousand.*" With such apparently overwhelming testimony in its favour, can we be much surprised, that sufficient enthusiasm should have been excited amongst the credulous, for the establishment of the Perkinistic Institution? A meeting was called for the purpose; the undertaking was unanimously resolved upon, and a subscription opened to carry the proposed charity into effect. The list was soon honoured by above a hundred subscribers, several with a donation of ten guineas, and only one or two subscribing annually less than one guinea. Lord Rivers was elected President of the Society; and eleven other persons of distinction, among whom was Governor Franklin, son of the illustrious Doctor, composed the list of Vice-presidents. On the 25th of July, 1803, a large house was opened in Frith street, Soho square, for the reception of patients, and in which the medical attendant, matron, and servants constantly resided. The objects of this establishment—as stated by the society in their publication on the subject—appeared to be philanthropic, and were as follows:—First. To afford relief to the disorders of the afflicted and industrious poor of the metropolis, if the remedy should be found capable of that desirable purpose: and—Secondly. To submit the long controverted question on the merits of the metallic tractors to the test of the severest scrutiny, the ordeal of experiment by disinterested persons, and thereby enable the public to form a correct opinion on the just pretensions of Perkinism:" —and it was farther proposed, in the report of the committee, that the British Parliament should investigate the merits of Perkinism, "and if convinced of its utility, honour it with similar patronage to other modern discoveries for the benefit of mankind." Yet, humiliating reflection! In a very brief space of time, the enthusiasm and the institutions died away; and no one, at the present day, believes that the effect was anything more than an additional case, showing the success, that must ever follow, for a time, the efforts of empiricism and pretension. Whilst the delusion regarding Perkinism was at its height, Dr. Haygarth determined to ascertain how far the effects might be ascribed to the imagination. He accordingly formed pieces of wood into the shape of tractors, and with much assumed pomp and ceremony applied them to a number of sick persons, who had been previously prepared to expect something extraordinary. He not only employed them in nervous diseases, but in all kinds of cases; and the effects were found to be astonishing. Obstinate pains of the limbs were suddenly cured. Joints, that had been long immovable, were restored to motion, and, "in short," says Dr. Bostock, "except the renewal of lost parts, or the change of mechanical structure, nothing seemed beyond their power to accomplish."

Animal magnetism, as well as the employment of the magnet, for the cure of disease, is, at the present day, exerting its therapeutical influence, partly through the same agencies. It is in such cases as those in which the tractors were found beneficial, that they succeed.

All these facts lead us back to the great influence exerted by the *moral* on the *physique*. Daily experience shows how satisfactorily a case of disease may proceed, if the faith of the patient be implicitly yielded to the physician, and to the mode of treatment he is pursuing; and how unhappily everything is apt to go on, when the contrary is the case. The author has already cited a case, in which the same remedy had opposite effects, when prescribed by two different physicians—the confidence of the patient being reposed in the one, and not in the other. It is equally important, for the successful operation of a medicine, that the confidence of the patient should be reposed in it, otherwise disappointment is apt to ensue; and, on the other hand, imagination or faith may render inert medicines efficacious, and may even cause a medicine to have effects the very opposite to those which it usually exerts. The late Dr. James Gregory, of Edinburgh, was in the habit of relating an anecdote in his lectures, in illustration of the last-mentioned effect. A student, who was labouring under fever, and who was under the care of the doctor, required the administration of an anodyne; and he was accordingly informed by the doctor, that he would order one for him, to be taken at bed-time. The patient, however, thought he said *cathartic.* The next morning, when the doctor called, he inquired what effect the anodyne had produced? "Anodyne!" replied the young man, "I understood it was a purgative, and a very active one it has proved. I have had four copious stools, and feel much relieved." In Paris's life of Sir Humphry Davy there is a case equally instructive. Dr. Beddoes having inferred, that the inhalation of the nitrous oxide must be a specific for palsy, a patient was selected for trial, and placed under the care of young Davy. Previous to administering the gas, Davy inserted a small thermometer under the tongue of the patient to ascertain the temperature. The paralytic, deeply impressed by Dr. Beddoes with the certainty of the success of the remedy, of which he knew nothing, no sooner felt the thermometer in the mouth than he declared he felt better. Nothing more was done, and the sick man was requested to return on the following day. The same ceremony was repeated with the same result, and, *at the end of a fortnight, he was dismissed cured,*—no remedy of any kind, except the thermometer, having been used!

It will be easily understood, then, how important and extensive may be the influence exerted by the mind over the body, in a therapeutical point of view, and that it is not unimportant to inquire into the likes and dislikes, the prepossessions and antipathies, of patients. It will often happen, that in the course of a long disease a desire may be felt for particular articles of diet, which may not seem, at first sight, extremely appropriate; but, in such cases, unless manifest evil would be likely to result, it is better to humour the individual slightly, or at least not to resist him strongly: for it occasionally happens, that instinctive desires or appetites are felt, which may not only be indulged in moderation with impunity, but with obvious benefit. The refrigerant regimen was at one time carefully avoided;—so long indeed as the doctrine of concoction of humours persisted; and one of the greatest improvements in the practice of physic, as applied to febrile diseases, is the free adoption of the cooling system, whenever the state of the body will admit of it. Instinct here led the way, and experience has proved the correctness of its monitions. The efforts of the practitioner, in a case of simple fever, are, indeed, mainly restricted to the employment of the refrigerant class of remedies. A prejudice is still found, however, against the use of iced water in fever where calomel is given. The feeling exists strongly in many parts of the Southern and Middle States, but it is rapidly yielding, and ought to be altogether abolished. Some cases have occurred in which individuals have caught cold, or have had disagreeable symptoms supervening, after cold water has followed calomel; but they have been cases of the *post hoc,* rather than of the *propter hoc.* The author has been for years in the habit of allowing the use of iced water after calomel in fevers, and has never had the slightest evidence of any disagreeable results from it.

7. PROFESSIONS, AND WAY OF LIFE.

These circumstances exert much influence not only on the susceptibility to disease, but on the indications of cure, and the mode in which these indications have to be fulfilled. This is strikingly exemplified in the agency of those physical circumstances, that affect the economy through the mucous membrane of the digestive tube. If this has been regularly, and for a long period, excited beyond its healthy action by the use of alcoholic potations, not only is the foundation laid for diseases in other organs, but the whole frame becomes liable to unhealthy inflammatory excitement, on the application of causes, which would have been incapable of producing the same results on the individual before his system had been thus inordinately excited. The draymen, porters, coal-heavers and others of the British metropolis, who drink a gallon or more of strong porter during the day, and daily, although they bear the appearance of rude health, are liable to erysipelatous inflammation after the slightest external injury; and, when attacked by severe internal disease, do not bear the abstraction of blood like those of sound constitution and temperate habits.

But, independently of such habits, mode of life has a manifest effect upon the organism. The labourer, who is exposed to every vicissitude, is less susceptible to impressions, and consequently demands larger doses of medicines to produce the same effect, than he who is brought up in idleness and luxury. The effect of such habits is to render the frame extremely impressible, and hence the number of the nervous and the hysterical is infinitely greater amongst the upper classes of society. In this country, we have not the difference of way of life so signally exhibited as in Oriental climes, where a distinct classification exists in society. Amidst the revolutions, that occur in the fate of families, where the law of primogeniture does not hold, there is not much opportunity for tracing the effects of labour or of luxury through many generations; but in Hindustan, where a difference of castes has existed from time immemorial, and where the barriers are effectually closed so as to prevent the entrance of the unprivileged, the effect is clearly shown. The artisans are above the tillers of the soil, and they exhibit in their conformation, as well as in their functions, the influence of a greater degree of refinement. The same remark applies to the Polynesians, where a like division exists.

It is in the investigation of disease that the knowledge of the profession or calling is a more important topic of inquiry, than in Therapeutics. In order to appreciate accurately, in many cases, the causes and seat of a disease, the nature of the daily occupation must be known. The flax-dresser, for example, the glass-cutter, the needle-pointer, &c., are liable to diseases of the chest, owing to the minute particles, given off in their operations, entering the lungs, and exciting irritation there, so as to produce many and fatal pulmonary maladies. Lead, again, gives rise to a series of symptoms, which have been called, collectively, 'lead colic,' or *colica pictonum*. When a person, consequently, labouring under those symptoms, presents himself to the pathologist, the inquiry suggests itself, whether he may not belong to one of those occupations in which lead is used,—as in smelting the metal, manufacturing sheet lead, or white lead, plumbing, glazing, painting, and composing in printing offices. By handling the metal, the carbonate of lead gets upon the fingers, and is swallowed, provided due cleanliness be not adopted. That this is the mode in which the poison of lead is often received into the system is shown by the fact, that at an extensive smelting establishment in Cornwall, at which cases of *colica pictonum* were extremely common, the disease was almost abolished after an order had been issued, and rigorously enforced, that no artisan should be permitted to partake of food until he had washed his hands carefully with the assistance of a nail-brush.

These inquiries are altogether etiological, and they afford us examples of the cessation of the effect, after the removal of the cause. Reference has already been made to the fact, that although this may often follow, in an immense multitude of cases, the diseased action may still persist after the removal of the cause. In the large class of diseases, that are symptomatic, everything depends upon the accurate investigation and appreciation of the primary lesion; and this is often one of the most difficult points of pathological inquiry. "The greatest attention of the physician," says Bégin, "is often required to enable him to discover the real causes of the disease before him. A few months ago I was called to a woman labouring under oppression of the chest, with a dry and frequent cough, and a painful sense of suffocation recurring at intervals: besides these symptoms, there was constant headache and vertigo, the conjunctiva was injected; and the pulse was full, hard, and not much accelerated. For two months, her menses had disappeared, in consequence of a violent mental affection. A copious bleeding, warranted by her vigor and youth, caused a subsidence of the cerebral symptoms; the menses reappeared; but the pectoral symptoms continued. During ten or fifteen days, I directed my treatment against what I considered to be irritation—either sanguineous or nervous—of the bronchi, but unsuccessfully. At last, during one of my visits, whilst conversing with my patient, I observed her executing that remarkable motion which accompanies difficult and painful deglutition.

On my inquiring whether she often had to execute that motion, she answered in the affirmative. I then proceeded to examine the mouth: a slight irritation existed about the pharynx and tonsils; the uvula was elongated, filiform, and descended along the base of the tongue as far as the epiglottis. The true cause of the disease was now disclosed. The exuberant appendage of the velum palati was immediately removed in the usual way, and all the symptoms disappeared."

This case is not novel—although M. Bégin seems to regard it so. It has long been admitted, that elongation of the uvula, by irritating the top of the larynx, may develope the ordinary symptoms of phthisis, in such as are predisposed to the disease; and it can readily be seen, that if tubercles already exist in the lungs, it can scarcely fail to excite them to suppuration. M. Bégin, however, uses the case cited as the foundation for a remark, that "circumstances of this kind are not unfrequent. The 'physiological doctrine,' in unfolding the origin and nature of a vast number of symptoms, heretofore considered as essential affections, has diminished the catalogue of diseases, and rendered their treatment more methodical and efficacious." The 'physiological doctrine' has certainly not been without its good fruits; but the case, selected by M. Bégin to prove this, is not fortunate. It was not the doctrine, that attracted his attention to the uvula, but the symptoms, and they would equally have done so, had no 'physiological doctrine' ever existed. The doctrine has been as much injured by injudicious friends as by open enemies; and it is partly owing to want of discretion, that it is now scarcely spoken of, except as a matter of medical history.

8. CAUSES, SEAT, PERIOD, &c., OF THE DISEASE.

Enough has been said respecting the modifications of the indications, and the mode of fulfilling them, according to the causes, and seat of the malady. It need scarcely be remarked, that the period of the disease likewise exerts considerable influence, and is occasionally a source of difficulty to the therapeutist. In febrile diseases, the use of stimulants has been almost abandoned; but cases at times occur, when they seem to be indicated, and the practitioner is compelled to proceed with caution, and to decide with judgment, in his appreciation, whether they be indicated or the contrary. Dr. Rush affirmed, that there was a period in fevers, when blisters might be had recourse to with advantage as stimulants, and to this period he gave the name 'blistering point.' If the excitement was above this point, blisters were improper; if below, the contrary. The difficulty would manifestly be, to know it. It is not fixed with thermometric accuracy, and, consequently, the idea of the blistering point fell to the ground with its distinguished proposer. It will be seen, too, hereafter, that blisters are by no means unobjectionable agents in the very cases, referred to by Dr. Rush as requiring the administration of excitants.

In inflammatory affections, the period of the disease occasions modifications, which cannot escape the observant practitioner. Inflammation is apt to terminate in various ways, and it is important for the therapeutist to determine whether such termination—as it is technically called—has supervened; inasmuch as many of the ordinary signs of inflammation may be still kept up in consequence of the disordered action persisting, to a greater or less extent, in the affected tissues. Pneumonia, for example, may end in the effusion of a serous fluid into the lungs, or into the cavity of the pleura; and this fluid may keep up irritation there. The excited state of vessels, too, may continue in the seat of inflammation, though not to the same extent; and a very different system of medication may be advisable from that which was adopted before such effusion occurred; or at least the same activity of management may be altogether inadmissible. In like manner, in the inflammations of mucous membranes, which have persisted for a long time—or, in other words, have become chronic—excitant applications are made to take the place of the soothing, which were adopted in the earlier stages with obvious advantage.

Under different states or conditions of the body, remedies are found to produce the most various effects. During the existence of spasm in any portion of the system, opium may be given in immense quantities without inducing its wonted action. The author has sat by the bed-side of a delicate female, labouring under the *cholelithus means* of Good—that is, under gallstone in its progress along the ductus communis choledochus—to whom he has given tincture of opium by the tea-spoonful, until she took upwards of an ounce, yet without any stupor following its administration. In like manner, in neuralgia, extreme doses of narcotics may be demanded, as well as in mania and melancholia, delirium tremens, tetanus, hydrophobia, &c.—diseases in which the cerebro-spinal nervous system is profoundly affected, and in which the great nervous centre can be impressed with extreme difficulty. It is but lately, that an interesting lady, labouring under puerperal mania, took twelve grains of solid opium in the period of twenty-four hours; and an engineer of one of the Philadelphia steamboats, affected with a severe neuralgic attack in the intestines, took fifteen grains in the same time without the least evidence of narcosis.

It is unnecessary to dwell upon this point. In every case of diseased manifestation, the mode of treatment has to be modified by the intensity, character, and period of the affection, whether the morbid action be above the median line or below it; or, in other words, whether excitants or sedatives appear to be indicated from the first.

To sum up.—It has been shown, that, amongst the most important circumstances, which modify the indications of cure in disease, and the mode of fulfilling those indications, are—age, sex, original conformation, habit, climate, mental affections, professions, and way of life, as well as the causes, period, and seat of the disease; and that all these have to be attended to, in order, that the therapeutist may be enabled to administer his medicinal agents with judgment and efficiency.

CHAPTER III.

OF MEDICINES.

A MEDICINE DEFINED—GENERAL ACTION OF MEDICINES—VARIOUS MODES OF ACTION—BY SIMPLE, DIRECT OR LOCAL ACTION—BY INDIRECT OR GENERAL ACTION—THROUGH THE NERVES—THROUGH ABSORPTION—THROUGH REVULSION—MEDICINES DIVISIBLE INTO EXCITANTS AND SEDATIVES—CLASSIFICATION OF MEDICINES—BARBIER'S CLASSIFICATION—A. T. THOMSON'S CLASSIFICATION—AUTHOR'S CLASSIFICATION.

A MEDICINE, in the enlarged sense, is any agent which is administered for the purpose of curing or allaying morbid action. This definition would include the different articles of diet and regimen, which are employed medicinally; and if we were to go into a nicety of definition, we might have to point out the difference between aliments, medicines, and poisons, but this is unnecessary. The term is well understood to be appropriated to those agents, that are had recourse to therapeutically; or, in other words, to the various articles, which are received into the pharmacopœias or dispensatories, or which, in consequence of their action upon some tissue of the body, ought to be received into them. The Greek word φαρμακον signified both poison and medicine; and the generality of medicines are capable of exerting a deleterious agency if administered in too large a dose.

Every medicinal agent—to produce its effect—must impress some surface of the body, and it must perhaps be capable of impressing the surface, whether in a healthy or diseased state. To this, however, some plausible objections might be urged,—both directly, and from analogy. For example, it is well known, that the secretions do not act upon the parts with which they are destined to come in contact, when such parts are in a state of health; but if they become diseased, then the same secretions may excite violent irritation. This is exemplified in ardor urinæ, an appellation, which indicates a symptom, not a disease. When the lining membrane of the urethra is healthy, the urine passes over it without exciting any uneasy sensation; but when it is inflamed —as in blennorrhœa—the healthy fluid excites violent irritation, and such a sensation of heat as to cause the mischief to be ascribed to the urine;—hence the name *ardor urinæ*—and the French name *chaudepisse.*

An acrid condition of the bile has often, also, been adduced as the cause of diarrhœa. A better pathology teaches us, that the primary source of irritation is usually—universally perhaps—in the lining membrane of the digestive tube, and that the liver is secondarily implicated;—the vitiated condition of the bile being very rarely, perhaps, the main cause of bowel affections.

Again, we have an instance in which the same remedy has very different effects according to the varying condition of the organ. Most of the believers in the abortive powers of the *Ergota* or *ergot of rye* consider it devoid of action upon the unimpregnated uterus: many of them think it is capable of producing abortion, and all, that it adds to the efficiency of the parturient efforts, when once the process has become established. These, and other facts, might induce us to accord with Sir Gilbert Blane, and Dr. Paris, that medicines are frequently but relative agents, producing their effects in reference only to the state of the living frame; and there is truth in the remark of Sir Gilbert, that the virtues of medicines cannot be fairly essayed, nor beneficially ascertained, by trying their effects on sound subjects, because that particular morbid condition does not exist, which they may be exclusively calculated to remove; "thus, in certain states of debility, *tonics* may excite the system when languid, by their sympathetic influence upon the *primæ viæ;* while in a robust condition of the body, the effects of the same agents may be wholly inappreciable." As a general rule, however, we should be justified in doubting the potent medicinal efficacy of any agent, which produces no effect whatever on the healthy body.

1. MODUS OPERANDI OF MEDICINES.

The *modus operandi* of remedies is not always clear; yet, by careful analysis, we can generally appreciate it—in the main results at least—although we may have much difficulty in comprehending the precise mode in which these results are accomplished. This applies especially to those cases in which the agency takes place by sympathetic influence,—an influence proverbially obscure, and frequently invoked with the view of covering the ignorance of the observer; as *vitality,* and *organic action* are, at times, used by the physiologist, when the function cannot be explained by any known physical facts or arguments.

The modes in which the agency of remedies is exerted are chiefly as follows.

a. BY SIMPLE, DIRECT, OR LOCAL ACTION.

When a drug is taken into the stomach, it may merely affect that organ by simple contact; and no sensible impression may be made elsewhere. This is the simplest mode in which remedial agents act; and we have examples of the same kind in the application of caustics to parts, which we are desirous of eroding or destroying; in the use of astringents in hæmatemesis, and in cases of hemorrhoids, when the remedy is applied so as to come into immediate contact with the affected parts; in the use of collutories for sore mouth; of external agents in ordinary local inflammation; and of a poultice in suppurative inflammation.

Inflammation, according to its degree, affords us a good example of the mode in which disease may either be wholly local, or implicate the general system; and, likewise, of the way in which our remedial agents may affect the frame locally or generally. In a slight case of inflammation, we have the morbid action confined altogether to the capillaries implicated. The heart and larger arteries do not participate; and the efforts of the practitioner are principally directed to the use of agents, whose operation may be confined to the inflamed part. But if the inflammation be more severe, the whole circulatory system sympathizes, and remedies are required, which will act both on that system generally, and on the vessels more immediately concerned. At times, however, we see the very best results from applications, which are directed simply to the inflamed part; and as the increased action becomes soothed in the part, the soothing influence is propagated to the rest of the system, in the same manner as the morbific influence was in the first instance. In cases of inflammation of the conjunctiva, a few drops of a weak solution of nitrate of silver, thrown into the eye, will often allay the irritation almost instantaneously, and the increased action of the vessels communicating with the over-dilated capillaries speedily subsides; but if, on the other hand, a very strong solution of nitrate of silver, or of any other astringent, be dropped into the diseased eye, it may excite intense irritation there, and the vascular apparatus of the part, and even of the whole system may be thrown by it into a state of turmoil. If we then soothe by appropriate applications, the turmoil ceases. In these last cases, we have examples, not only of the purely local or direct action of medicines; but also of the extension of this action elsewhere;—constituting the next mode of operation, which we have to consider.

b. BY INDIRECT OR GENERAL ACTION.

This is the mode commonly adopted in the administration of remedies. In most cases of internal exhibition, the agent must first come in contact with the stomach, and, through this organ—the great 'centre of sympathies,' as it has been long considered, and designated—other parts become impressed, according to the elective affinity of the particular article for some tissue or organ rather than for another. It is owing to the stomach being so intimately associated with other parts, that it is generally chosen as the organ, through which remedies are to act. If the functions of the stomach be disordered, as in dyspepsia, the whole system sympathizes; there is not an organ that does not feel the depressing irradiations; the brain and nervous system may become so disordered that the patient is subject to all kinds of hallucinations; and hypochondriasis thus becomes a common concomitant of dyspepsia. Nauseating remedies, again, exert their effect, through the stomach, on the whole system, so as to be most valuable agents in diseases of increased action; and, in short, as the different parts of the system can be affected by impressions conveyed through the stomach,—so, conversely, no irritation can persist for any great length of time in any organ, without the stomach suffering; hence it is, that it has been designated the centre of sympathies.

The manner, in which this indirect effect of medicines is induced, is as follows.

1. *Through the Nerves.*

Between every part of the capillary surface of the body there is the greatest sympathy or consent; so that if any one be inordinately and irregularly excited, parts at a distance sympathize; and this to a greater or less degree, according as such parts are more or less disposed to take upon them, at the time, a similar derangement. This is seen when the feet are exposed to cold and moisture; derangement takes place in the functions of the capillaries of the feet, and this derangement is reflected to every part of the capillary surface, so that in a dozen individuals exposed to this cause of disease, the derangements may be as various in their seats as are the individuals themselves; owing to the greater predisposition of some particular organ to assume a morbid action in one rather than in another. Now, that which applies to the external capillary surface applies equally to the internal expansion of the skin forming the mucous membranes, so that medicines, received into the stomach, by impressing the capillaries of that organ, may produce sympathetic results on parts at a distance.

That medicines do exert their influence through the nerves—as one *modus operandi*—is unquestionable. Dupuy divided the pneumogastric nerves in a horse, and then introduced two ounces of nux vomica, in the form of a bolus, into the stomach. No unpleasant consequences followed; whilst another horse—equal in size and strength to the former—to which the same quantity of the poison was administered, died in a few hours in violent tetanic convulsions. It is probable, that the reason, why the former did not suffer, was the division of the nerves; but a doubt might be raised, with much plausibility in its favour, whether it was *directly* dependent upon this, or *indirectly*, owing to the function of absorption having been destroyed by the section. The researches of modern Toxicologists have indeed furnished us with cases, that are unequivocal; one of which is sufficient for our purpose. If strong hydrocyanic acid be applied to the tongue of an animal, it dies instantaneously;—so rapidly, indeed, that there is not time enough to remove it from the lap of the experimenter before life has ceased. In this case, it would seem to be impossible for the poison to have entered the blood-vessels, and to have passed, with the current of the circulation, to the great vital organ on which its deleterious agency is exerted. In many cases of poisoning, death is doubtless produced by the action of the poison on the nerves distributed to the coats of the blood-vessel, as where the poison is injected into the veins, and destroys life instantaneously.

Several of our medicinal agents, it will be found, act by preference on the nervous system, and of these all do not act upon it in the same way. Opium, for example, affects the brain, causing stupor; strychnia, the brain and spinal marrow, producing tetanic convulsions; and prussic acid excites coma with tetanus. The precise ground of these differences is inscrutable; yet that they exist cannot be denied. There is a manifest affinity between particular remedial agents, and particular parts of the frame; and in whatever manner these agents are administered—whether by the stomach, or by the skin, or by infusion into the blood—they seek out the organs on which they act by preference; yet, why tartrate of antimony and potassa should produce vomiting, when injected into the venous system, and rhubarb purge—why this elective affinity should exist—is unknown.

We can likewise affect distant parts by applying our remedial agents to the cutaneous surface. The author has already referred to the effect, produced on the capillary system elsewhere, by the irregular action induced through exposing the feet to cold and moisture. The effect of ablution, as a refrigerant in fever, is another example. If the skin be steadily hot and dry, cold or tepid water may be applied by ablution or sponging, so as to greatly diminish the morbid heat; and, accordingly, it is one of the most valuable febrifuge remedies which we possess. The capillary system, to which the cold or tepid fluid is applied, has its action diminished, and, through that extensive sympathy, which has been mentioned as existing between every part of the capillary system, the sedative influence is speedily extended to the rest of the frame. It is to the external capillary surface, that most of our energetic counter-irritants or revulsives are applied; although we shall find, that various local stimulants, administered internally, are indebted, for much of their efficacy, to the derivation or revulsion they excite. It obviously would be a matter of moment, if we could discover the parts that more particularly sympathize with each other, in order that our revulsives, and other agents might be applied with full effect, but this is a matter of difficulty, demanding a degree of patient investigation, which but few possess.

Dr. Thomson regards the organ of smelling as a third medium for receiving the impression of medicinal agents on the nervous system: the effect, he remarks, "is chiefly produced on the first and the fifth pairs of nerves distributed over the schneiderian membrane, lining the nostril, the adjoining sinuses, and the convoluted bones, so beautifully contrived to extend this surface in a limited space;" and he adds, that "many substances, which are supposed to enter the system by pulmonary absorption, such as the fumes of alcohol, tobacco, and ammonia, affect the habit solely by impressions made on the nerves of smelling." In support of this opinion, he quotes numerous experiments by Dr. Rousseau, of Philadelphia, which appeared to warrant the conclusion, that by simply closing the nostrils, either by compressing them with the fingers, or by filling them up, the fumes of ardent spirits, or of a strong decoction of tobacco, or an infusion of opium might be inhaled for an hour, without any unpleasant effect; whereas if the precaution were omitted, the consequences were found to be most distressing. Notwithstanding, however, the mode in which these results are stated, the author cannot help doubting the accuracy of the experiments, and, of necessity, the deductions founded upon them. When these substances are inhaled, either by the nose or the mouth, they come in contact with branches of the fifth pair of nerves. In the nose, it is true, they impinge also upon the ramifications of the first pair or the olfactories; but, on the other hand, in the mouth, they meet with branches of the hypoglossal and glosso-pharyngeal. It is admitted, that more effect is produced on the nervous system, when they are passed through the nose, than when they traverse the mouth; but this is perhaps owing to the greater degree of velocity with which they are made to enter the former than the latter cavity, so that the nasal nerves are more powerfully impressed than the buccal, and—as the supporters of absorption would say—their entrance into the circulation through the mucous membrane rendered more ready; but it is not necessary—as, Dr. Thomson thinks is the general belief—that such absorption should be pulmonary. All the mucous membranes are absorbing surfaces, and although a portion of the fumes may pass, along with the inspired air, into the ultimate bronchial ramifications, and be there absorbed, imbibition takes place in every part of the mucous membrane, from the place where it commingles with the skin at the mouth, to the point of termination of the minute air tubes; nor did the author know, that any one entertained the opinion, that ammonia enters the system by pulmonary absorption. As well might it be presumed, that any inorganic and mechanical excitant, applied to the nasal nerves, exerts its agency by such absorption.

Of the precise mode in which medicinal agents influence the nerves, we know little or nothing. It is not necessary, that the surface, with which they come in contact, should be physically modified, or that any organic change may be perceptible. In the case of the instantaneously fatal application of the hydrocyanic acid, to which reference has been made, there is no time allowed for the supervention of organic modifications in the part to which it is applied. The lethiferous influence is at once exerted on the nerves with which it is placed in contact, and the irradiations proceed from thence along the nerves—with the rapidity of lightning along conducting wires—to the great vital centres, whose action ceases on the instant, and immediately afterwards that of every tributary organ.

The mode, in which the influence of medicines is extended to different organs, through the nerves, probably differs. In many cases, the impression, made upon the part to which the agent is applied, passes immediately to the brain, and is thence reflected to the sympathizing organ. This is probably the way in which medicinal agents generally produce their effect through sympathy; but in certain cases it would seem, that this reflection is not indispensable. A demulcent, by passing over the top of the larynx, may produce a soothing influence there, which may extend to other parts of the pulmonary mucous membrane—by what is termed *sympathy of continuity*, effected perhaps through continuous nerves. In the same manner, the action of a suppository, or of a glyster excites the upper parts of the intestinal tube to contraction. Physiology and pathology, indeed, furnish multitudes of examples of this kind of sympathy, as well as of the *sympathy of continuity*, of which we have an instance, where the muscular coat of the intestines is aroused to increased action, by the irritation of a cathartic on the mucous coat; or, where we attempt to produce an emmenagogue effect by the administration of cathartics—such as the preparations of aloes—whose action is mainly exerted on the lower part of the bowels. The generality of physiologists of the present day look to the nervous system as the great source and medium of communication of the different irradiations, by which distant organs are supposed to react sympathetically upon each other. The rapidity, indeed, with which the various actions of the nervous system are executed,—the apparent synchronism between the reception of an impression on an organ of sense, and its perception by the brain, as well as between the determinations of the will and their effect upon a muscle,—naturally attracted the attention of physiologists to this system as the instrument of sympathy; and we certainly know enough to infer, that, in many cases, in animals, the nerves appear to be the conductors; that the brain is, in others, the centre, to which the organ, in action, transmits its irradiations, and by which they are reflected to the sympathizing organ; whilst, in others, again, the effect is caused in the absence of nervous centre, and perhaps even of nerves, in a manner, which, in the present state of our knowledge, is inexplicable. It is not difficult, however, to conceive, that by means of contractility, impressions—vibratory or other—may pass rapidly from one part of the organism to another, as they do in the vegetable, which—if we admit it to be possessed of a nervous system at all—has it in a primitive and rudimental form, and has certainly nothing like a nervous centre for the reflection of impressions. Vibrations, it is well known, communicated through the air from a sonorous body when struck, impress the organ of hearing, and light probably acts in a similar manner upon the visual apparatus, and we may suppose, without any violence to probability, that a similar vibration may exist in the human organism, so that an impression made upon one part may rapidly oscillate to another, independently of anything like nervous communication.

2. *Through Absorption.*

The proofs, that medicines may be absorbed from the alimentary canal and elsewhere, in their entire state, are as numerous as they are satisfactory. It is but necessary, that a substance should possess the requisite tenuity to soak through the coats of the veins, and, in this way, get into the circulatory current. The facts and arguments, connected with the absorbent function of the veins, are so fully detailed in another work, (*Human Physiology,*) that a simple reference to them here, will be all that is necessary. But few physiologists of the present day doubt, that those vessels are capable of this function; yet it is denied by one therapeutic writer, (*Prof. Chapman,* of Philadelphia,) that medicines can pass unchanged into the venous system, or, in other words, that they can be absorbed in their entire state: the assertion and belief have been designated as a "relict of the humoral pathology;" and he affirms, that "it must at least be acknowledged, that no substance in its active state does reach the circulation, since it is shown, that a small portion, even of the mildest fluid—as milk, or mucilage, oil, or pus—cannot be injected into the blood-vessels, without occasioning the most fatal consequences." Setting aside the multitude of facts, which show, that substances may be absorbed by the veins, and be detected by chemical reagents in the blood, we know well, that they can be injected directly into the blood without producing death; and that, since the time of Harvey until the present day, the 'INFUSION'—as it has been termed—of medicinal agents into the blood has been a common practice. It is asserted to have been first employed in 1657, at the suggestion of Sir Christopher Wren, and it has been practised at the veterinary school of Copenhagen, with complete success,—the action of the agent being more speedy, and the dose required much less when thus administered. Experiments of this kind have confirmed the well known but singular fact—already referred to—that medicinal substances exert their action by preference upon certain parts of the body, in the same manner as if they had been received into the stomach. Tartarized antimony vomits, and castor oil purges, not only as certainly, but with much greater speed; for, whilst the former requires to be in the stomach for fifteen or twenty minutes, before vomiting is excited, it produces its effect in one or two minutes, when thrown into the veins. Of late years, the custom has been, in certain diseases and in numerous experiments, to load the blood-vessels with warm water, so as to induce a state of preternatural fulness, and, in cholera, the quantity of saline solution injected has been enormous. The great, the necessary precaution appears to be, that the fluid should not be too viscid; for it has been found, that thick fluids, such as oil, or mixtures of powders, are unable to pass through the pulmonary capillaries, in consequence of which the circulation is arrested, and death follows: and within these limits, the remark of Professor Chapman is correct. Such was the result of several experiments on animals with powdered substances, undertaken by an enthusiastic physician of Boston—Dr. E. Hale, junior—who had nearly fallen a victim to an experiment of this kind instituted on himself. Dr. Hale, desirous of observing the effects of castor oil when thus injected, attempted to pass it into a vein of the arm; he experienced, however, considerable difficulty in introducing it, and to this his safety has been ascribed. Soon after the injection he felt an oily taste in the mouth, which continued for a length of time, and the medicine acted powerfully as a cathartic.

Again, a good deal depends upon the mode in which the injection is sent in,—as regards velocity. If a drachm of healthy bile be suddenly thrown into the femoral vein in a state of concentration, death soon follows; but if it be suffered to pass in very slowly, little or no inconvenience results. It was the opinion of Bichat, that if a bubble of air should accidentally enter the venous system, it would cause death; but the experiments of Nysten and Magendie have shown, that if it be introduced slowly, no unfortunate event need be apprehended. It is a cause of death after severe surgical operations, although it is not more than a quarter of a century since the *ratio moriendi*, in such cases, was first suspected. Some animals will admit enormous quantities of air into the veins without perishing. Magendie instances the case of a horse, into whose veins he sent, as rapidly and forcibly as he was able, forty or fifty pints of air without occasioning immediate death, although the animal ultimately expired; and Lepelletier de la Sarthe alludes to similar experiments of his own, from which he infers, that the fatal action of the air is mechanical, and that it is possible to prevent the result by injecting so gradually, that the blood has power to disseminate, and perhaps even to dissolve, the gas with sufficient promptitude to prevent its accumulation in the cardiac cavities. (See the author's *Human Physiology*, 4th edit. ii. p. 37; Philad. 1841.) No doubt, then, ought, we think, to exist, that medicines can be absorbed from the stomach or elsewhere in their entire state, and that when once in the circulation they may act on the nerves distributed to the inner coat of the vessels, so as to affect the great nervous centres, or may proceed with the current to act upon those organs for which they have a preference.

Substances may be absorbed from the cutaneous surface, although this is infinitely less easy than from its prolongation, which constitutes the mucous membranes. The cuticle is a great obstacle to absorption, for if it be removed in any manner, so that a substance, capable of absorption, can come in contact with the vessels of the corpus papillare, absorption takes place readily. The same thing happens—to a more limited extent—if we force the substance by friction through the cuticle. This is the mode in which we affect the system by means of the mercurial unguents. We select a part of the body where the cuticle is thinnest, and continue the friction until the globules of mercury disappear, or until it has been forced through the cuticle into contact with the corpus papillare. The most undoubted evidence exists, that the mercury enters the blood. Dr. Colson detected it by introducing plates of polished brass into the blood, which became covered with a coating of mercury; and Dr. Christison affirms, that it has been obtained from the crassamentum of persons salivated, when no mercury could be detected in the serum. (See, on the subject of absorption remedies, Pereira's *Elements of the Materia Medica and Therapeutics*, 2d edit. p. 109. Lond. 1842.) The method of administration by friction is called the *Iatraleptic;*[*] the one which consists in placing remedies in contact with an abraded or vesicated surface, the *endermic.*[†] The latter method has been chiefly employed in recent times, and it has been advised by Bally and others, where, it was conceived, digestion would interfere with the action of the drug,—a succedaneum, which, according to the peculiar views of Professor Chapman, would be wholly inoperative, inasmuch as he considers every section of the absorbent system to be endowed with the power of digestion and assimilation, and the lymphatics quite as conspicuously as the lacteals; a capacity given as a provision of nature, to exclude noxious matters from the circulation. This opinion is a necessary pendant to the Professor's doctrines regarding the mode in which substances can enter the vessels.

Substances may likewise be received into the system, in their entire state, by the lungs. The whole of the respiratory apparatus is lined by a mucous membrane resembling that of the digestive passages, and as the substances, which enter the air tubes, are extremely tenuous, they can pass with facility into the blood-vessels. It is with this view, that narcotic and certain other inhalations are employed. The different respirable gases produce their effect in this way; and hence the hilarity caused by the protoxide of azote or the laughing gas; and the exciting or depressing influences, that can be produced by inhaling appropriate gases.

Reference has already been made to the opinion of Rousseau, and Thomson, that ardent spirits exert their intoxicating influence by impressing the nasal nerves; but it is more likely, that much of the intoxicating effect produced on those who pump ardent spirits from large casks into small vessels, in extensive wholesale establishments, is owing to the vapour of the alcohol entering the lungs with the inspired air, and being imbibed by the pulmonary vessels. It is probably in this way, that miasmata—both terrestrial and animal—exert their influence;—their first impression being made either on the nerves distributed to the coats of the pulmonary blood-vessels, or on the brain when carried thither with the circulatory fluid. That they, occasionally at least, act in the former way seems to be suggested by the rapidity with which the effects are exhibited, when a person, who—owing to previous attacks of malarious disease, has been rendered unusually susceptible to the action of miasmata,—is subjected to their influence.

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[*] From ιατρος, 'physician,' and αλειφω, 'I anoint.'

[†] From εν, 'in,' and δερμα, 'the skin.'

Thus far attention has been directed to the absorption of medicinal substances in their entire state. It often happens, however, that they are decomposed prior to, or after entering the circulation. One writer on Therapeutics, already cited, (*Prof. Chapman,*) has, indeed, supposed, that in all those cases in which salts appear to have entered the blood in their entire state they are decomposed in the stomach; that their components enter the circulation under the influence of the vital energies, which prevent them from recombining; but that, as soon as they reach the secretory or excretory organs, they are thrown, as it were, beyond the sphere of those energies; and their chemical affinities being brought into play, they recombine, and the substance is again perceptible, or can be detected, by tests, in the excretions. A satisfactory reply to this hypothesis is, that substances have actually been detected, in their entire state, in the blood; and besides, no great advantage to the economy could accrue from the decomposition in many cases, as the elements would be more injurious than the compound. The objections, indeed, to this view are signal. When substances can pass so readily into the vessels by imbibition, there is no necessity for invoking this operose process; and it has been seen, that no advantage to the economy could result from it. There are, however, many medicinal agents, which require to be set free in the stomach before they can act on that organ. When certain vegetable substances are administered, especially in decoction or infusion, the parts, that are susceptible of digestion,—the mucilage, extractive, &c.,—are converted, whilst the medicinal component exerts its appropriate agency. Dr. Thomson thinks it is to this circumstance, that we may ascribe the time, which elapses between the swallowing of certain medicines, and the period when their operation becomes apparent. "Thus," he says, "if half a drachm of powder of the root of ipecacuanha be swallowed, from fifteen to thirty minutes generally elapse before vomiting is produced, a circumstance, which we may fairly attribute to the envelopment of the emetina—the active constituent of the ipecacuanha, in the wax, gum, starch, and ligneous matter of the root; it cannot exert its influence until extricated from these by the process of digestion." But this is not a happy illustration of his position, inasmuch as the same length of time is required for the emetic operation, when ipecacuanha is given in forms that are devoid of these vegetable accompaniments, as in the *vinum ipecacuanhæ* of the pharmacopœias, or in the various preparations of its active ingredient—*emetia.* Tartar emetic, too, is as long in inducing emesis, although it is well adapted for rapid absorption, or for instantaneous action on the nerves of the stomach. It will be seen hereafter, that a more satisfactory mode exists of accounting for the delay in the operation of both these useful drugs, when exhibited for the purpose of acting as emetics.

Almost all writers on pharmacology affirm, that the acetate of potassa is decomposed in the stomach,—the acid being digested, whilst the alkali passes into the circulation, and is excreted by the kidneys. This, however, may be questioned,—at least as regards a part. The free acids, which are present in the stomach in a state of health, are the chlorohydric, and the acetic, or lactic; and if the alkali of the acetate of potassa were set free during digestion, a part at least would be laid hold of by the chlorohydric acid, and enter the circulation as chloride of potassium. The fact of the existence of those acids in the healthy stomach shows, that many substances, when taken into that organ, must undergo decomposition through their agency. In the case of the acetate of potassa,—the free chlorohydric acid, doubtless, lays hold of all the potassa, unless the quantity of the acetate be very large. In the dyspeptic, affected with unusual predominance of acid, any alkaline carbonate taken into the stomach excites effervescence, in the same manner as when added to the chlorohydric, or acetic, or lactic acid out of the body. Nitrate of silver is a substance, which can rarely enter the circulation unchanged. It is possessed of caustic properties, and is often used to destroy fungous granulations in wounds and ulcers. When applied in such cases, the nitrate is decomposed by the animal matter with which it is made to come in contact; the oxide of silver remains on the surface, and, by exposure to the air, becomes black. If the salt, too, be taken internally, for any length of time, it is apt to produce a leaden hue of the surface. "Now it is evident," says Dr. Thomson, "that this effect could not take place if the nitrate of silver were not taken into the circulation in an undecomposed state: for if the nitrate were decomposed in the stomach, and converted into muriate of silver, this is an insoluble salt, and consequently not fitted to be taken up by the absorbents. But if we admit, that the nitrate of silver is taken into the circulation in its undecomposed state, we can readily explain the manner of its decomposition by the capillary vessels of the skin, and its deposition in the rete mucosum, in the state of an insoluble muriate, which would necessarily render any tinge, communicated by it to the skin, permanent." It is difficult, however, to see, how the nitrate can escape decomposition from the chlorohydric acid always existing in the healthy stomach, as well as from the chloride of sodium, which is present in the humours. It is probable, indeed, that, in the small quantity, in which it is administered internally, it never enters the circulation in the state of nitrate, but always in that of chloride; which,—as Dr. Thomson properly remarks,—is insoluble; but this is not an insuperable obstacle to its absorption. Calomel is equally insoluble, yet we want no proof, that the system is capable of being readily affected by it. The insoluble chloride of silver enters the sanguiferous system, is deposited in the rete mucosum, and—under the influence of light—is converted from a white, to a dark violet colour,—an effect, which can be easily proved, by exposing chloride of silver to light, out of the body.

The corrosive chloride of mercury or corrosive sublimate sometimes undergoes a conversion of great interest to the toxicologist. It may happen that a person has been poisoned by the corrosive chloride, and yet there may be no evidence of the presence of anything, except the mild chloride or calomel. In such case, how are we to know, whether the mild chloride be the result of the decomposition of the corrosive chloride, or whether the person may not have taken the mild chloride, a short time prior to dissolution. When the corrosive chloride meets with albuminous matters, it is decomposed by them, and converted into mild chloride; but, in such case, the mild chloride is intimately united with them, and if the decomposition has been produced by the animal matter of the coats of the intestines, it will be intimately united with these tunics; whilst, if the mild chloride has been taken prior to dissolution, it may be observed lying upon the mucous surface, and in no way amalgamated with it.

Sometimes, it would seem, after an article has passed into the circulation, it is decomposed, either in the blood, or in some of the organs. If we force mercury through the skin, we can affect the salivary glands, and whilst the system is pervaded by the mercury, a gold watch exhibits, by its white coating, that the mercury is exhaled by the cutaneous surface. In like manner, if blue pill, or calomel, be administered in adequate quantity internally, the watch will be equally coated by the mercury. We do not know the exact condition of the exhaled metal in these cases; whether, in the case of the mercurial ointment and blue pill, it be still oxide, —in the state of calomel, still mild chloride;—or whether, in all these instances, it be not decomposed, and given off in the form of mercurial vapour. The fact, that metallic mercury has been detected in the bodies of such as have died under its influence, leads us to presume, that the metal may be reduced, and be exhaled in the form of vapour, so as to occasion the coating in question.

When substances enter the blood by absorption, if they can chemically combine with any of the principles of that fluid, they probably do so; but this is not so readily accomplished, as might be presumed, owing to the quantity of organic matter, which frequently interferes largely with inorganic affinities. Out of the body, we have full opportunity for witnessing the changes induced by the gases, and by various agents, on the blood, prior to coagulation, and whilst still endowed with vitality. They are signal; and similar changes would, doubtless, be produced, could the same agents be applied, in the same state of concentration, to the blood, whilst circulating in the vessels. Numerous experiments have shown, that when certain substances have been given for a long time, the blood is rendered much thinner; whilst directly contrary effects are observed to follow the use of others;—the coagulum being firmer, and the blood of a deep, or dark colour. As the pabulum, therefore, of the different nutritive processes is modified, we can readily comprehend, that the functions of secretion and nutrition may be importantly modified also.

The difference in the rapidity with which the absorption of medicinal agents is accomplished is great. It is dependent upon the degree of distension of the vessels, and on the existence or absence of erethism in the part. If polyæmia or vascular fulness exists, absorption is tardily effected; but if blood-letting be premised, the substance speedily passes through the coats of the blood-vessels, and enters the circulation. In some experiments by Magendie, in which water was injected into the vessels, so as to produce a state of artificial plethora, and a fluid was thrown into a serous cavity, it was found, that whilst the state of plethora existed, none of the fluid entered the circulation, but when blood was drawn from a vein,—as it was abstracted, the fluid in the serous cavity rapidly disappeared under the eye of the observer, by soaking through the coats of the vessels, and entering the circulatory current. Hence it is, that in those active effusions or transudations into serous cavities, which constitute dropsies, blood-letting is a most philosophical and energetic remedy.

It has been said, that the activity of absorption is greatly dependent upon the existence or absence of erethism in the part. If the lining membrane of the intestinal canal be in a state of great irritation or inflammation, the digestive, and other absorptions are no longer accomplished. This is strikingly the case in malignant cholera, which usually consists of a peculiar excitation in the capillaries of the intestinal mucous membrane. Under this excitement, the watery portions of the blood are exhaled, until that fluid is, in many cases, left so thick, as to be unable to pass along the vessels; and this, notwithstanding nutritive fluids may have been constantly and freely administered. It is, on this account, also, that there is frequently so much difficulty in affecting gastro-enteritic patients with mercury. In the last stages of many of the bilious and typhoid forms of fever, the absorbent function of the intestines is almost annihilated, in consequence of the irritation in the mucous membrane of the digestive tube.

C. THROUGH REVULSION.

There is yet another, and a most important mode, in which medicinal agents exert their efficacy, viz. by *revulsion*, or *derivation*. It is a general rule, in the animal economy, that two diseased actions do not readily go on at the same time, with the like degree of intensity. This has been the subject of remark for ages, and for all ages; and many popular remedies have been suggested by a knowledge of the fact. When any morbid action is going on in the system, and a new source of irritation is artificially excited, it often happens, that the new irritation, by attracting the nervous and vascular afflux to it, detracts or derives from the internal morbid action, so as to diminish, or wholly remove it. It is in this way that blisters, and the various counter-irritants, issues, setons, moxas, &c., produce their beneficial effects, not by the discharge which they occasion. Hence it is, too, that good results from a popular remedy,—the application of a garlic poultice to the thumb in cases of toothache. But these are only marked examples of revulsion. It results, likewise, from the action of every local stimulant. It follows the use of cathartics, and is the way in which their chief remedial agency is, in many cases, exerted. In head affections, especially in apoplexy, a revulsion, thus effected, is often most salutary; and for this purpose, when deglutition is impracticable, and even when not, powerfully stimulating enemata are thrown into the rectum with decided advantage. In like manner, the milder cathartics may be productive of benefit in gastro-enteritic affections by the succession of sympathies, which they induce, in passing over the different tracts of the intestinal canal. Diuretics, and in short, as already remarked, all local stimulants owe a part of their efficacy to revulsion; and some of the most valuable agents we possess in the treatment of protracted disease,—as mercury and iodine,—are often employed with no other view. The avowed object of the practitioner is to excite a new action; or in other words to produce, artificially, a new condition of the system of nutrition, which may remove that, which has been so long existing.

The doctrine of revulsion reposes on the received belief, that diseases are cured by remedies that are counter to them,—'*contraria contrariis medentur;*' but an imposing medical sect has attempted, and is attempting, to overthrow this doctrine, and to set up the opposite,—'*similia similibus medentur.*' The '*Homœopathists,*' as they are termed,[*] maintain, that there are remedial agents, which can produce symptoms similar to those of disease, and that every dynamic affection of the living organism can be destroyed by another of still greater intensity, and permanence, that strongly resembles it. (*Organon der Heilkunst*, von Samuel Hahnemann; 5te Auflage. Dresden und Leipzig, 1833; S. 94.) They maintain, indeed, that the curative virtues of medicines are *solely* dependent upon the resemblance their symptoms bear to those of the disease. There are but three modes, they affirm, of applying medicines in disease; *first*, the *homœopathic; secondly*, the *allopathic*[*] or *heteropathic*,[†]—the method in general use, which is said by them never to regard that which is really diseased in the body, but to attack parts that are sound, in order to draw off the malady from another quarter, and direct it towards the latter; and *thirdly*, the *antipathic*,[‡] *enantiopathic*,[§] or *palliative:* by which method they affirm, physicians have, till the present time, succeeded in affording apparent relief, and gained the confidence of their patients, by deluding them with a temporary suspension of their sufferings.[‖]

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[*] From ὁμοιος, 'like,' and παθος, 'disease.'

Upwards of a quarter of a century ago, Samuel Hahnemann —the founder of the 'homœopathic medical doctrine,'—first propounded his opinions in the authoritative form of the '*Organon der rationellen Heilkunde*,'—'*Organum of rational medical science*.' The book was issued from the Dresden press, but it did not at first attract, in a marked manner, the attention of physicians. In 1819, a second edition appeared, under its present title,—the epithet *rationellen* or *rational*, having been omitted. Since that time, it has passed through different editions, and the English reader, who is not a German scholar, is now enabled to peruse it through the medium of a translation. (*The Homœopathic Medical Doctrine*, etc. translated from the German by Charles H. Devrient, Esq. with notes, by Samuel Stratten, M. D. Dublin, 1833, 8vo.)

It is not the author's intention to inquire into the principles and merits of this fantastic doctrine at length; but a few observations may be made upon it. Cinchona appears to have been the first drug experimented with by Hahnemann. Whilst occupied in translating the Materia Medica of Cullen into his own tongue, he was dissatisfied with the explanation of the febrifuge powers of that drug, and determined to make trials upon himself. He took it in considerable quantity, while in perfect health, and found it produced symptoms like those of ague. Hence, he inferred, that intermittents are removed by cinchona, in consequence of its exciting in the system a morbid condition, similar to that for the removal of which it is administered.

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[*] From αλλος, 'another,' and παθος, 'affection.'
[†] From ἑτερος, 'another,' and παθος, 'affection.'
[‡] From αντι, 'against,' and παθος, 'affection.'
[§] From εναντιος, 'opposite,' and παθος, 'affection.'
[‖] Op. cit. § 54 to 56.

Again,—say the homœopathists,—mercurial preparations, when administered internally, produce symptoms—local and constitutional—so closely resembling the symptoms of syphilis, that medical practitioners, who have spent years in the investigation of syphilis, find it difficult, and in some instances impossible, to distinguish one disease from the other. If the venereal poison produces pustules, scales and tubercles, mercury does the same. If syphilis is attended with inflammation of the periosteum and caries of the bones; so is the action of mercury. "Inflammation of the iris from lues," says Dr. Stratten, "is an every day occurrence; the same disease is a very frequent consequence of mercury. Ulceration of the throat is a common symptom of syphilis; the same affection results from mercury. Ulcers on the organs of reproduction are the result of both the poison and the remedy; and furnish another proof of the doctrine *similia similibus.* Nitric acid is generally recommended in cutaneous diseases; the internal use of this remedy, in a very dilute form, produces scaly eruptions over the surface of the body; and the external application of a solution, in the proportion of one part acid to one hundred and twenty-eight parts water, will produce inflammation and ulceration of the skin. These observations would lead to the conclusion, that nitric acid cures cutaneous diseases, by the facility it possesses of producing a similar disease of the skin. Nitrate of potash, administered internally, in small doses, produces a frequent desire to pass water, accompanied with pain and heat. When this state of the urinary system exists as a consequence of disease, or the application of a blister, a very dilute solution of the same remedy has been found beneficial. The ordinary effects of hyoscyamus niger are vertigo, delirium, stupefaction, and somnolency. Where one or other of these diseased states exists, it yields to small doses of the tincture of this plant. The internal use of hyoscyamus is followed by mental aberration, the leading features of which are jealousy and irascibility. When these hallucinations exist, this remedy is indicated. Opium in general causes drowsiness, torpor, and deep sleep; and yet this remedy, in small doses, removes these symptoms when they occur in disease. Sulphur is a specific against itch; notwithstanding which, when it is administered to healthy individuals, it frequently excites a pustular eruption resembling itch in every particular."*

Dr. Stratten asserts, that these deductions are drawn from actual experiment: and so, we are told, are all the positions advanced by the homœopathists.

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* Op. cit. p. vi.

The doses of medicines, administered by them are infinitesimally small; the millionth degree of dilution is very common. The following extract from Hahnemann's treatise on chronic diseases, will show to what an extent the farce is carried.

"Of homœopathic medicines, take one grain of those which are solid, (mercury being included in the number,) or one drop of those which are liquid; put this small quantity on about the third part of a hundred grains of pulverized sugar of milk in a porcelain capsule that is not glazed; then mix the medicine and the sugar of milk together for a moment, with a spatula of bone or horn, and pound the whole strongly during six minutes. The mass is then detached from the bottom of the capsule and pestle during four minutes, in order that it may be perfectly homogeneous, and then rub down afresh during six minutes with equal force. Collect the whole of the powder into a body during four minutes, then add the second *third portion* of the sugar of milk, and mix the whole for an instant with a spatula; then triturate with force during six minutes. This is to be once more scraped together during four minutes, and rubbed again for six minutes. Stir the whole together during four minutes, and add the *last third* portion of the sugar of milk, which is to be mixed by turning it about with the spatula; then triturate the mass powerfully during six minutes, scrape it together during four minutes, and the whole is finally to be rubbed down for six minutes. After the powder has been carefully detached from the capsule and pestle, put it into a phial, and let it be corked and labelled with the name of the substance, and the mark $\overline{100}$, which shows that the substance is in the hundredth degree of attenuation. To carry the medicine to the ten thousanth degree of attenuation, take one grain of the powder marked $\overline{100}$, prepared as above, add the same to the third part of an hundred grains of pulverized sugar of milk, mix the whole in the capsule, and proceed in such manner, that after having triturated each third portion with force during six minutes, scrape the mass together during a space of four minutes. The powder, when thus prepared, is put into a well corked bottle with the figures $\overline{10{,}000}$ marked on the exterior, which will point out its degree of attenuation.

"The same method is observed when this second powder marked $\overline{10{,}000}$ is to be carried to the millionth degree of attenuation," &c. &c.*

The homœopathic method can only be regarded as a branch of the *expectant* stem; and it is liable to every objection that applies to the latter. The homœopathists argue, however, that, inasmuch as very small portions of a chemical substance can be detected in a solution, so may minute portions be capable of impressing the organism. For example,—say they,—one grain of nitrate of silver, dissolved in one thousand five hundred and sixty grains of distilled water, will yield an evident gray precipitate—perceptible in every part of the fluid—when two grains of muriatic acid are added to it;—and again:—when one grain of iodine is dissolved in a drachm of alcohol, and mixed in the same quantity of distilled water as in the last case, and to this two grains of starch, dissolved in an ounce of water are added, an evident blue tint is produced in the solution. In these experiments, consequently, the grain of the nitrate of silver and iodine must have been divided into one-fifteen thousand two hundred and sixtieth of a grain. These experiments, however, are in nowise elucidative of the position;—for although such minute portions of chemical agents may be detected by the senses, it by no means follows, that they can exert a remedial action. Accordingly, it is affirmed (*Andral*) that when the homœopathic system has been impartially tried, it has not been found to succeed in the manner asserted by its supporters. Like the expectant method in general, it is totally inefficient in acute cases; but, like it, where advantage is to be derived from trusting to that recuperative power, which, we have seen, is seated in all living bodies, and is too much neglected, its adoption is beneficial. This is one of the useful lessons, which the system aids in teaching. Another, perhaps, is,—the propriety, now universally admitted, of simplicity in our prescriptions,—in consequence of the greater or less uncertainty that must often exist—where two or more agents are thrown together—whether they may not mutually modify each other's action. The Homœopathists believe, that every disease carries with it a great susceptibility for the proper medicine; and accordingly, they lay down the rule, that only one simple medicine should be administered to the sick at a time.

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* Op. cit. 312.

One of the strangest of the assertions of Hahnemann and his followers is—that homœopathic medicines acquire at each division or dilution a new degree of power, by the rubbing or shaking to which they are subjected, "a means," says Hahnemann, "of developing the inherent virtues of homœopathic medicines that was unknown till my time; and which is so energetic, *that latterly I have been forced, by experience, to reduce the number of shakes to two, of which I formerly prescribed ten to each dilution"!!*[*]

Such are the chief modes in which medicinal agents exert their influence on the human economy.

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[*] Hahnemann's words are, "dass ich in den letzern Jahren durch überzeugende Erfahrung genöthigt ward, die ehemals vorgeschriebenen *zehn* Schüttelschläge nach jeder Verdünnung bis auf *zwei* einzuschranken.—*Organon der Heilkunst*, § 280.

I. Their agency may be altogether direct or local.
II. It may be general—through local influence.
    1. By means of the nerves.
    2. By absorption.
    3. By revulsion.

2. CLASSIFICATION OF MEDICINES.

The unbounded credulity, which at one time prevailed regarding the effects of drugs, and which so long disfigured the science of medicine, has now almost passed away; and we observe less and less of the old feeling of confidence in the adaptation of particular drugs to particular cases of disease. The practice has become more rational; and efficacious agents are now mainly relied on. Still many superfluities exist in the lists of the materia medica, which might, with much propriety, be dispensed with; and time will accomplish this. The plan now is,—to discover the seat and nature of the diseased action, and to adapt a remedy, whose properties are known, to the exigency;—*locally* or *generally*, as the case may require. We have no agents, that are possessed of specific properties, which are exerted with unvarying uniformity on disease. Their action is modified by numerous circumstances. A cathartic may, in one case, excite emesis in place of catharsis; and, in another, an emetic may excite catharsis rather than emesis; whilst the words *febrifuge*, *antispasmodic*, &c., are mere terms to express the secondary result of some agent on the vital solid. It is in consequence of medicines possessing no *specific*—no uniform—influence, that so much skill and attention are required in the treatment of disease. At one time, it was supposed, that certain drugs are specifically adapted to combat certain morbid conditions, but the belief, except with the homœopathists, is now exploded, and even mercury—the panacea of some—is denied to possess any such power, and its action is more rationally accounted for. From what has been said, it will appear, that although we may be perfectly acquainted with the ordinary medicinal properties of a drug, and although these properties may be essentially the same, the agency, exerted by it, may be different according to the precise character of the disease, and according to the age, sex, temperament, &c., of the patient. Were these points determinate, we could always calculate with certainty what would be the precise action of any medicinal agent.

With regard to the parts of the frame on which medicines act, we may affirm, that they are capable of affecting every tissue and every function—directly or indirectly. Like other influences, which surround the body, and are perpetually impressing it in some mode or other, remedial agents can act upon the living organs so as to modify every function. Ultimately, however, they must all affect the same great vital property of contractility, irritability, incitability, or excitability, whichsoever we may term it, and which is seated in every living tissue. Under the influence of this vital property, kept in action by appropriate stimuli, all the functions are accomplished, and when these stimuli are at a certain degree, they are accomplished in health; but if, from any cause, the vital force becomes exalted or depressed beyond the healthy standard, disease results; and such disease is a disease of increased or of diminished action. All medicinal agents, which, in this way, exalt the vital activity of the body, are *excitants;* and such as diminish it are *sedatives;* and we may, consequently, with propriety, class all agents, that are useful, or that are not wholly inert, either as *excitants* or as *sedatives.*— The subject of the classification of medicinal agents will, however, require a little farther consideration.

The advantages of classification in science are obvious. The relations of articles to each other are, in this way, exhibited, so as to impress the memory, and to facilitate the investigations of the student; but in no branch of science is it applicable under more difficulties than in Therapeutics, provided we are desirous of establishing such classification on the precise operation of medicinal agents; whilst nothing is more easy than to form a natural classification of them, founded simply on the three great kingdoms of nature to which they may respectively belong. Both these modes of classification, termed respectively the *Therapeutical* and the *Natural Historical,* have been detailed in all their varieties in recent works on Materia Medica and Therapeutics. (Pereira, *Elements of Materia Medica and Therapeutics,* 2d edit.; Lond. 1842: and Bellingham, *Elements of Materia Medica and Pharmacy,* Pt. i. p. 217; Dublin, 1841.) The classifications of medicinal agents, based on their operation, are numerous, and, at the same time, most unsatisfactory. Immense labour, and, of course, valuable time, have been spent upon the subject, without any rich fruit. It has been already said, that all remedial agents, which are possessed of activity, must belong to one of two classes,—*stimulants* or *excitants,* and *sedatives;* we must except, however, certain agents, whose effects are purely chemical or medicinal, or which are not employed to effect any changes in the vital tissue. Perhaps the best of all classifications would be one founded upon the agency exerted on the different tissues; but this arrangement, in the present state of science, is by no means easy, and, moreover, the action of medicines is so associated with certain terms,—as narcotics, tonics, sedatives, &c., employed to denote certain operations, which they are esteemed capable of producing, that, to abandon them, would be to throw obstacles in the path of the student, without the ultimate advantage accruing to him—of possessing a better knowledge of the *modus operandi* of medicines, than when a classification, somewhat resembling those usually embraced, is adopted. The classification of Barbier is founded upon the tissues affected, but it is extremely incomplete, and unsatisfactory, and, in consequence of the impracticability experienced by him in grouping the various agents under appropriate heads, his last unmeaning division is, of course, a large one.

BARBIER'S CLASSIFICATION.

MEDICINES	Which strengthen the tissue of organs, - - -	1. *Tonics.*
	Which stimulate the tissue of organs, - - -	2. *Excitants.* 3. *Diffusibles.*
	Which relax the tissue of organs,	4. *Emollients.*
	Which moderate too great activity of organs, - -	5. *Temperants.*
	Which diminish cerebral life, -	6. *Narcotics.*
	Which irritate the inner surface of the intestines, - -	7. *Purgatives.*
	Which irritate the gastro-duodenal surface especially, -	8. *Emetics.*
	Which disturb the natural movements of the intestines, -	9. *Laxatives.*
	Whose modus operandi is not determined, or which cannot be included in the preceding classes, - - -	10. *Incertæ sedis.*

One of the most recent classifications—and the notice of any more would be unprofitable—is that of Dr. A. T. Thomson, founded upon the classifications of Dr. Thomas Young, and Dr. Murray. It, also, is liable to the objections, which must apply to all attempts to reduce the multitude of medicinal agents to anything like a scientific arrangement, as well as to others, which appertain to it exclusively.

It is as follows:

I. VITAL AGENTS.

A. Influencing the body generally;

a.—By operating directly upon the nervous system.

* *Increasing action*, - - - -		Excitants.
** *Diminishing action*,	*Primarily*,	Sedatives. Refrigerants.
	Secondarily,	Narcotics. Antispasmodics.

b.—On the Muscular and Sanguiferous systems:

- Tonics.
- Astringents.

c.—On the Secerning system:

- Errhines.
- Sialogogues.
- Expectorants.
- Emetics.
- Cathartics.
- Diuretics.
- Emmenagogues.
- Diaphoretics.

B.—Influencing the body solely by their action on the part to which they are applied.

- Epispastics.
  - a. *Rubefacients.*
  - b. *Vesicants.*
  - c. *Actual cauterants.*

II. CHEMICAL AGENTS.

A.—Influencing the state of the body, or its contents, by their chemical properties.

* *Acting on the surface,* - - Escharotics.
- a. *Potential cauterants.*

** *On the contents of cavities.*
- Antacids.
- Antalkalies.
- a. *Antiseptics.*
- Antilithics.

III. MECHANICAL AGENTS.

- Demulcents.
- Diluents.

To the three great divisions of Dr. Thomson no objection can be urged; but when the different subdivisions, and the ascribed *modus operandi* of many of the classes are considered, much room is found for difference of sentiment. It may be observed by anticipation, that there is no adequate ground for placing *Excitants* among those agents, that operate directly on the nervous system; and *Tonics*, amongst those, that act on the muscular and sanguiferous systems; nor is it readily seen, how *Epispastics* can be regarded as the only agents, that influence the body *solely* by their action on the part to which they are applied. The class of *Anthelmintics*, which could not have fallen conveniently under any of Dr. Thomson's subdivisions—with the views, which he probably entertains of the mode, in which their therapeutical agency is exerted—has been wholly omitted; and although anthelmintic virtues are assigned to the ordinary medicinal agents, that are conceived to possess such virtues,—when these agents are referred to under other heads,—it is singular, that the class is neither mentioned in the table, nor in the body of the work. It seems to have altogether escaped Dr. Thomson's attention.

To the following classifications of the author, objections may doubtless be urged. He has already said, that it is impracticable to form any, which can be altogether unobjectionable. It has been more than once remarked, that all agents, capable of affecting the vital tissue so as to modify its functions effectively, may be classed under the head of *excitants*, or of *sedatives*. But, in addition to these—what may be called—'*vital agents*,' there are some other classes of medicines, which, in consequence of their effect being almost purely chemical, without modifying the condition of the vital tissue, may be appropriately designated *chemical agents;* and, again, there is one other class—equally without direct influence on the vital manifestations, and acting simply or chiefly on the mass of humours—which may be properly ranked under the denomination of *mechanical agents.* This is probably as simple a classification as can be made, and one altogether intelligible to the student. It does not involve questions connected with the intimate *modus operandi*, which must necessarily engage attention in considering the different classes, whilst it embraces some classes not admitted into the arrangement of Thomson, and which, it will be seen, comprise some of our most useful medicinal agents. The class of *Anthelmintics*—in the sense of—"medicines, which prevent the generation of entozoa within the body," is placed next to the class of tonics; because the predisponent cause of their unusual multiplication is a want of tone of the system generally, and of the stomach in particular; and if we confine our attention to the destruction of these parasites by true anthelmintics, or, in other words, by agents directly destructive to entozoic life, we do but little;—the most important step being to remove the predisposition to fresh generation; as, in the case of intermittent fever, the main object of the practitioner is less directed to the condition of the patient during the paroxysms, than to the prevention of their recurrence.

CLASSIFICATION OF THERAPEUTICAL AGENTS.

- I. VITAL AGENTS.
  - *Excitants.* increasing action generally, or locally, or both.
    - Excitants proper.
    - Tonics.
    - Anthelmintics.
    - Astringents.
    - Emetics.
    - Cathartics.
    - Emmenagogues.
    - Abortives.
    - Diaphoretics.
    - Errhines.
    - Sialogogues.
    - Diuretics.
    - Expectorants.
    - Sorbefacients.
    - Revellents.
    - Antispasmodics.
  - *Sedatives.* diminishing action directly or indirectly.
    - Sedatives proper.
    - Narcotics.
    - Refrigerants.
    - Nauseants.
- II. CHEMICAL AGENTS. - - -
  - Antacids.
  - Antalkalies.
  - Antilithics.
  - Disinfectants.
- III. MECHANICAL AGENTS. - -
  - Demulcents.
  - Diluents.

This was the classification adopted by the author in the first edition of his *General Therapeutics;* but in the present, he finds it more convenient to embrace one that harmonizes more with the arrangement adopted in his *Practice of Medicine.* The different classes of therapeutical agents, and the agents themselves, will be investigated in the following order:

1. Agents that affect prominently the alimentary canal or its contents, - -
   - Emetics.
   - Cathartics.
   - Anthelmintics.
2. Agents that affect prominently the respiratory organs, - - - - - -
   - Expectorants.
3. Agents that affect prominently the follicular or glandular organs, - - -
   - Errhines.
   - Sialogogues.
   - Diuretics.
   - Antilithics.
   - Diaphoretics.

4. Agents that affect prominently the nervous system, - - - - - -	Narcotics. Tetanics. Antispasmodics.
5. Agents that affect prominently the organs of reproduction, - - - - - -	Emmenagogues. Parturients.
6. Agents that affect various organs, -	Excitants. Tonics. Astringents. Sedatives. Refrigerants. Revellents. Eutrophics.
7. Agents whose action is prominently chemical, - - - - - - -	Antacids. Antalkalies. Disinfectants.
8. Agents whose action is prominently mechanical, - - - - - -	Demulcents. Diluents.

SECTION 1.

AGENTS THAT AFFECT PROMINENTLY THE ALIMENTARY CANAL, OR ITS CONTENTS.

I. EMETICS.

Synon. *Vomitoria.*

Definition of emetics — Nauseants — Their modus operandi — Therapeutical application — Physiology of vomiting — Modus operandi of emetics — Effects on the stomach, and general system — Evils of their too frequent employment — Therapeutical application of emetics — Special emetics.

Emetics have been defined, agents, which, by the excitant effect they produce upon the stomach, give occasion to vomiting; (Schroff, *Taschenbuch der Arzneimittellehre*, s. 51:) but this definition is meagre and unsatisfactory. That of Dr. Paris is to be preferred:—“Substances which excite vomiting, independently of any effect arising from the stimulus of quantity, or of that occasioned by any nauseous taste or flavour.”

The physiology of vomiting has, of late years more especially, engaged the attention of some of the most accurate anatomists, and physiologists. At one time, it was universally conceived, that the stomach is the main—indeed, the sole—agent; whilst, at an after period, the opposite view was maintained, and the stomach was denied any agency whatever in the result. The intimate consideration of this topic of physiology has been gone into, in another work; (see the author's *Human Physiology*, 4th edit. i. 571, Philad. 1841:) and it is not necessary to repeat it here. It may be observed, however, that the former of the theories referred to, which prevailed of old, is full of error, and ought to be discarded; and that, as often happens, when exclusive and hostile views are maintained, the truth probably lies between them, or may consist of a combination of both. From a careful examination of what has been said on both sides of the question, it appears, that we are justified in inferring, that the stomach, of all the organs concerned, is the one whose action is least energetic and indispensable; that the pressure, exerted on its parietes by the diaphragm, and abdominal muscles, is the most powerful cause; as, it is found, that the more or less complete paralysis of the diaphragm, or the destruction of the abdominal muscles, renders vomiting much more feeble, and more slow in manifesting itself.

When an emetic has been taken in a sufficient dose, a train of phenomena make their appearance contrasting greatly with those that follow. An indescribable sensation is first of all experienced, which is chiefly referred to the region of the stomach, and consists of a feeling of anxiety and of circumgyration, which extends also to the head; a copious flow of saliva and of sweat takes place, with paleness of the surface, and indeed, every sign of diminished nervous and vascular action. This state of 'nausea,' as it is termed, is manifestly one of debility, or of diminution of the vital powers; and, when it has continued for any length of time, is usually succeeded by a very different condition of the functions; the diaphragm and abdominal muscles are thrown into violent contraction; an inverted action of the muscular coat of the stomach is produced; and, under these combined actions, the contents of the stomach are ejected. During this state of excited action, the pulse assumes fresh vigour: the skin becomes florid, especially that of the face; a copious, warm perspiration takes the place of the cold, clammy sweat of nausea, and all is energy where depression previously prevailed.

It is obvious, then, that the therapeutical effects of substances, capable of exciting emesis, must vary according as they are administered to keep up nausea, or given in doses sufficient to induce emesis; and, again, that emetics may differ amongst themselves according as their operation is preceded or not by more or less nausea.

Where the nauseant operation is alone induced, the effects of the remedy are so different as to demand a separate consideration.

I. NAUSEANTS.

The state of nausea being one of reduced action, it can be readily understood, that a sedative agency, thus induced, and kept up for a sufficient length of time, may succeed in subduing inflammation, and the morbid exaltation of organic actions which constitutes ordinary fever. These effects can be accomplished by nauseating remedies properly administered.

From the effects, then, which nauseants are capable of inducing, their therapeutical application will be sufficiently obvious, and, accordingly, but little difficulty is experienced by the practitioner in laying down his indications, or in carrying them into effect, by some one or more of the numerous nauseants, which are contained in the catalogues of the materia medica.

With regard to the condition of the functions under the influence of a nauseant,—when pushed to the extent of inducing marked nausea,—there can be no difference of opinion; but it has been a question, whether, if these same agents be given so as to fall short of inducing nausea, or any sensible evidences of their action,—in *alterative* doses, in other words,—they may not modify the functions in the same manner as full nauseants, but to a less degree.

A great deal may be said in favour of the affirmative view of this question, but it is one obviously not easy of demonstration. Were we, indeed, to deny the position altogether, it would be difficult to account satisfactorily for the operation of antimonials, or of many other reputed diaphoretics in small doses, which are emetic in larger. All admit, that when the tartrate of antimony and potassa is given so as to produce nausea, it is a decided sedative and diaphoretic,—diaphoretic because sedative. The state of nausea being, as already remarked, one of diminished action,—the exalted vital manifestations, constituting fever, are reduced by it; and diaphoresis, which had been checked by the febrile irritation, is restored. In this case, the antimonial,—like every diaphoretic,—is an indirect agent only. But if the tartrate of antimony and potassa be given in doses somewhat smaller than are requisite to induce nausea, it can still be conceived, that an action of sedation may be exerted, although, it must be confessed, that we have no sensible evidence of such an effect except the result; and, it must be equally confessed, that, in our uncertainty, we ought scarcely to place that confidence in those agents, which is occasionally reposed in them by practitioners. Fortunately, however,—as remarked under another section, in regard to antimonials especially,—this very confidence is, at times, followed by negatively beneficial results. It prevents the partisans of the perturbating treatment of fever by means of violent and repeated cathartics from causing as much irritation as they might otherwise do, and gives the patient a little of that quietude and absence from disturbance, which is so important in the management of all febrile cases, and especially of such as are accompanied by erethism in the mucous membrane of the intestines.

Therapeutical application of Nauseants.

In internal inflammation.—In all internal inflammations, nauseants are obviously proper, as well as in every kind of active hemorrhage; whenever, indeed, it is desirable to diminish the force and velocity of the circulatory movements. In such cases, they are amongst our most valuable therapeutical means, and, if the system can be kept, for any length of time, sufficiently under their influence, the local hyperæmia will often yield, after it has resisted other agencies. In a case of pericarditis, which fell under the author's care, some time ago, and which threatened fatal results, the acetate of morphia was administered in a full sedative dose;—this salt being preferred to opium in consequence of the latter disagreeing in the particular case. The nausea, caused by it, was intense; but the symptoms were so much ameliorated, that the dose was repeated: in this way, the nausea was kept up for forty-eight hours, and, during this condition of sedation, the inflammatory signs disappeared, and the patient doubtless owed her safety mainly to the nauseant agency.

In constipation.—In constipation, a union of nauseants with cathartics becomes occasionally advisable, and at times effectual, after cathartics alone have been unsuccessfully employed. If the constipation be dependent upon any irritated condition of the exhalents of the canal, the use of debilitants,—such as those now under consideration,—reduces the erethism, and facilitates the operation of the purgative. Whenever, too, it is desirous to break in upon a morbid chain, and especially in the neuroses, nauseants may be beneficially administered: but, in these cases, the revulsion, induced by a nauseating emetic, is generally preferred, in consequence of the more powerful impression which it makes on the nervous system. This subject will, however, be fully canvassed, under the heads of EMETICS and REVELLENTS respectively. The practitioner has, in all cases, to reflect, whether the state of the organic actions be such as to require the debilitant agency, which nauseants are capable of exerting; (and it is not generally difficult to arrive at a correct conclusion.) Perhaps, in all cases, the tartrate of antimony and potassa is capable of fulfilling every desire of the physician; but, occasionally, other articles are selected:—ipecacuanha by some; squill—particularly when the affection is seated in the air passages—by others; but there is not sufficient reason for the belief, that any nauseant is preferable to the tartrate of antimony and potassa; and, moreover,—being devoid of any stimulating property,—it can be administered in many cases, in which the exciting emetics would be obviously improper.

In surgical cases.—With similar views to those that impress the physician, the surgeon has recourse to nauseants. Whenever it is desirable to depress the energies of the system, and to induce relaxation of constricted parts, they are advantageously employed. In *strangulated hernia*, tobacco smoke, or tobacco infusion is thrown into the rectum; but, as will be shown hereafter, the use of tobacco, even in this form, is not devoid of danger; and, perhaps, there is no relaxant effect produced by it, which might not be equally produced by the nauseants above mentioned.

When a luxated limb has to be reduced, the force of contraction of the muscles is diminished, during the existence of nausea; and, if the surgeon, at the time, employs his *manœuvres* dexterously, he may succeed in effecting the reduction.

In obstetrical cases.—To the obstetrical practitioner nauseants are no less useful. When tartar emetic is given so as to impress the system, it removes rigidity of the os uteri; and, in violent or irritable labour, the inordinate activity of the uterus is allayed by it, whilst the dilatation of the mouth of the organ is facilitated. Dr. Kennedy, of Dublin, has drawn the attention of practitioners to these cases, as well as to the value of nauseants in puerperal convulsions, in obstructed and inflamed mammæ, and in puerperal mania; but it is needless to attempt to point out every affection, in which nauseants may be employed with advantage. By bearing in mind the sedative influence they are capable of exerting, the practitioner can meet with little difficulty in deciding upon the cases in which their exhibition may be noxious or salutary.

II. EMETICS.

In order that an emetic shall produce its effect upon the stomach, it must first of all affect the brain. Should it irritate the nerves of the stomach, that irritation must be appreciated by the brain, and a reflex action be exerted upon the stomach, before it can discharge its contents. It is not necessary, however, that the impression should be first made on the gastric nerves. Certain sources of irritation, seated elsewhere, may impress the brain by their irradiations, and produce the same effect.

Various circumstances, affecting the nerves of the stomach, may excite vomiting;—for example, the administration of substances belonging to the class of emetics; over-distension of the organ; offensive character of food; morbid secretions from the supra-diaphragmatic portion of the alimentary canal, or from the stomach itself; reflux of bile into the stomach, &c. &c. In these cases, the impression is made upon the nerves of the stomach; thence it passes to the brain, which appreciates the sensation, and calls upon the different organs, concerned in vomiting, to execute their functions.

But numerous cases present themselves, in which the impression is first received on other parts than the stomach, and where it equally proceeds to the brain, which then calls for the action of the appropriate organs. Thus, the stomach sympathizes with an organ, that has been long suffering under chronic irritation: there is, indeed, scarcely an organ in the body, which, when affected with protracted suffering, does not disorder the functions of the stomach, and induce vomiting. The irritation of the uvula, when elongated; and the presence of tenacious phlegm in the posterior nares, bring on a kind of '*gagging*,' which is occasionally followed by full vomiting. We have examples, also, in which the nervous impression is even more remotely connected with the effects than in those selected. The sight of a disgusting object will '*turn the stomach*' of many. The same may be said of nauseous smells, and flavours; of riding, sailing—especially at sea, swinging, &c. In all these cases, the impression is made on the nerves; the great nervous centres being primarily or secondarily affected. Did it indeed admit of the slightest question, that the encephalon must always be implicated in the act of vomiting, the circumstance, that if its impressibility be blunted by narcotics, it is excessively difficult to excite vomiting,—a fact which has to be borne in mind when the therapeutist is called upon to act in cases, where narcotics have been taken as poison,—would tend to establish the affirmative.

In many cases, the effect of an emetic agency—although apparently produced with inconceivable rapidity—must be the result of a very complex and reflex operation. When, for instance, pain in a distant organ sickens, the brain must accomplish the sensation; thence a reflex action must take place to every part of the surface of relation, and the gastric nerves be specially impressed, and call on the brain, to send the nervous influx to the organs particularly concerned in the act of vomiting.

When vomiting has continued for some time, accompanied by violent retching, more or less bile is always evacuated;—the inverted action of the stomach being extended to the duodenum; and the irritation, produced in the alimentary canal, being propagated along the biliary ducts to the liver, so that the secretion from it becomes augmented. It is a common belief, that where bile is discharged during vomiting, excited in this or in any other way, it is a proof, that the person is—what is termed—'*bilious;*'

but, for the reasons that have just been assigned, it may be no more than an evidence that emesis has taken place with retching. At times, in violent mischief affecting the intestinal canal—as in cases of *colica ileus*—the inverted action extends even as low down as the large intestine; the fæces are made to clear the ileocæcal valve, and are discharged by the mouth, giving rise to the alarming phenomenon of stercoraceous vomiting; but this never occurs from the administration of any emetic. It is always an index of serious lesion or obstruction of the intestinal tube.

The action of an emetic is local as regards the stomach, but it extends to almost every organ of the body. It has been already said, that its effect is that of an excitant to the nervous and sanguiferous systems, causing the blood to circulate more freely through the capillary vessels; and in this way trifling obstructions may be removed; but if the obstruction amounts to hyperæmia, and especially if this latter condition exists to any great extent, it may be increased by it. In all the varieties of hyperæmia, that characterize local inflammation, there is, as the author has attempted to show, an over-distended and atonic condition of the extreme vessels, induced by the blood having been sent into them, under some source of irritation, in undue quantity. This over-distended state of capillaries gives occasion to remora of blood in them, and excites the vessels, communicating with them, to inordinate action; and it is obvious, that if, in such a state, a remedial agent be administered, whose effect is to hurry the circulatory fluid towards the affected parts, the hyperæmia may be augmented. Accordingly, it might be supposed, that emetics would act injuriously, when any of the internal organs are labouring under inflammation. This would seem, indeed, to be a general principle of Therapeutics, and to be especially applicable to inflammation of those viscera, which are more particularly affected in a mechanical manner during the operation of vomiting; but exceptions can be readily imagined, or rather, there may be modifying circumstances, which may be urged against its universality. In active inflammation, for example, there is more or less concentration of the vital energy towards the inflamed part; but the effect of the operation of an emetic is to propel the blood towards every organ of the body, and thus to equalize the circulation.

There is, too, another effect of emetics, which enables us to produce positively beneficial results in internal inflammations of organs not immediately concerned in the act of vomiting; this is the *revulsive*—one of the most important, indeed, of therapeutical agencies. The stomach, and the organs more immediately concerned, are, in this way, made the centre of an artificial fluxion, which detracts from that existing in some other portion of the organism. Under this joint equalizing and revulsive agency, emetics are beneficially employed in certain inflammatory affections, notwithstanding their tendency to add to the hyperæmic condition;—the good, effected by the equalization and revulsion, largely preponderating over the injurious tendency in question.

During the efforts of vomiting, the abdominal viscera are compressed by the contraction of the diaphragm and abdominal muscles; hence the different secretions, which take place from them, are augmented; and a tendency to displacement is communicated, so that hernial protrusions may be produced,—or increased, if already existing. The different procidentiæ, too, of the pelvic viscera are injuriously affected by the pressure, and if the female be impregnated, abortion may be occasioned: indeed, there are certain obstetrical physiologists, who think, that the extrusion of the child, in parturition, is altogether accomplished by the contraction of the abdominal muscles,—a position, which would not appear to be tenable. By placing the hand on the abdomen during one of the violent throes of labour, that viscus can be felt contracting energetically; can be seen, indeed, to do so, where,—as in France,—the clothes are thrown up about the termination of labour, in order that the *élèves* may have an opportunity of inspecting the phenomena, connected with man's ingress into the world. Were it otherwise, there would seem to be no necessity for the development of muscular fibres, which is found to take place as the uterus becomes distended in utero-gestation.

In the efforts of vomiting, the circulation, as above remarked, becomes hurried, so that evil might result in those, who are labouring under aneurismal or other serious lesions of the heart and arteries; and instances are on record, where the vessels have given way during retching. The circulation through the lungs, as in every other part of the frame, becomes augmented in velocity; the secretions from the bronchial tubes are rendered more copious, and hence an emetic becomes an *expectorant*—an agent whose *modus operandi* will be inquired into hereafter. This effect is not facilitated alone in the manner mentioned. An additional force is invoked. The succussion communicated to the lungs, by the repeated contraction and relaxation of the diaphragm, during vomiting, not only increases the secretion, but dislodges it when secreted, so that it becomes loose and more readily expelled by coughing. Hence it happens, that a hard, and dry cough is converted into one that is loose, and free.

In the accelerated action of the larger organs of circulation, produced by vomiting, the capillary vessels participate; and a copious and warm perspiration usually supervenes, contrasting singularly with the cold, clammy perspiration of nausea. Hence emetics become *diaphoretics*.

As to their effect on the stomach itself, they may simply evacuate its contents, which may consist of food taken in, with the secretions from the supra-diaphragmatic portion of the tube as well as from the stomach itself. At times, these last secretions are morbid, and unless they are removed, they may become the source of irritation. This is especially the case in diseases accompanied with great erethism of the dermoid tissue. Whenever the cutaneous surface is extensively excited,—as indicated by great heat or by efflorescence,—the mucous membrane lining the stomach is apt to participate in the irritation, so that secretions of a morbid character take place from it: these secretions can be readily removed by the action of a gentle emetic. It is easy to see, however, that, under the excitation produced by emetics of powerful action, the lining membrane of the stomach must be more or less excited, and hence, a copious secretion of the mucous fluid takes place; mucus is observed to be mixed with the rejected matters, and, for the reasons already assigned, bile is generally present. But, if substances too irritating, or too violent in their action, be administered, the membrane may become inflamed and true gastro-enteritis result. It has been properly remarked, that the specific character of emetics and purgatives is merely stimulation, which may terminate, if the dose be very large, in inflammation and ulceration of the digestive mucous membrane. (*Broussais.*) The same author has well said, too, that the long-continued employment of stimulants—as emetics—greatly exalts the sensibility of the stomach, rendering the treatment protracted and difficult, and laying the foundation for repeated relapses. "Emetics," he remarks, "may unhesitatingly be placed at the head of the causes, which most promptly produce it," [exaltation of the sensibility of the stomach.] "We have collected some very remarkable examples of this kind of lesion in persons, who had been made to vomit for many hours by incessantly repeated doses of tartar emetic, or to whom this remedy had been administered for many days in succession. It is seldom after such errors, that the physician does not observe in his patients a permanent exaltation of the sensibility, and irritability of the stomach. We have at present under our care, (August, 1826,) a lady, who was subjected in 1813, by her physician, to emesis for three consecutive days, to cure a supposed gastric oppression. In the excess of his zeal, he thought it his duty to remain constantly with his patient, to make her take, at stated periods, doses of tartar emetic, which he had carefully put up himself. The very next day, symptoms of disorder in the hypochondriac region manifested themselves, with which the lady had never before been affected; and, from that period, it has been impossible, by any means, to calm the irritability of the stomach, or to blunt the painful sympathies, which accompany digestion. We have also attended numerous other neuropathic patients, who dated their disorders from repeated emetics, administered to them by the same physician, one of the greatest *emetizers* we know."

Full vomiting, accompanied with much retching, or nervous concentration on the stomach, promotes both exhalation and absorption. The cutaneous transpiration is augmented, as it is in the precursory state of nausea; but the perspiration, induced at these two periods, is essentially different. In the former case, it is the healthy, energetic action of vessels, similar to that, which takes place in rude health, under the agency of exercise or external warmth: in the latter, the whole system is labouring under temporary debility; and the cold clammy exudation sufficiently exhibits the diminished activity of the vital forces.

Absorption is affected by the same class of agents; but, with regard to the precise mode in which the result is produced, therapeutists differ. It cannot be because of the augmented secretion which takes place from the lining membrane of the stomach, for that is to a trifling amount;—so trifling, indeed, that it could not be expected from this cause, that any unusual demand would be made upon the absorbents of any part of the system. We can account for absorption being more energetically exerted, in cases of dropsy, for example, after the administration of agents, as hydragogue cathartics, which occasion a greater separation of the watery parts of the blood, or, after blood has been taken from the vessels; because here the quantity of circulating fluid being diminished, a more ready imbibition of the fluid of dropsy is effected; but this explanation does not well apply to the operation of emetics. It will be shown hereafter, that the nervous system is largely concerned in the operation of certain agents, that modify the function of nutrition, and this is probably the case in vomiting. The powerful nervous concentration on the stomach, and the different organs concerned in vomiting, interferes probably with the functions of nutrition and secretion, in other parts of the organism, so that less fluid may be exhaled, whilst that, which has already been deposited, passes readily through the coats of the blood-vessels by imbibition, and gains the fluid of the circulation. This modification of nutrition is exemplified in the disappearance of morbid growths, under the touch of royalty, the wand of the magician, and the incantations of the impostor.

From what has been said, it will be readily inferred, that emetics, like local stimulants in general, are valuable revellents, although, owing to the powerful effects they produce on the whole vascular and nervous system, they may not be susceptible of such useful application as cathartics, whose operation is more circumscribed. In head affections, for example, whilst cathartics are of great advantage by deriving from the encephalon, and occasioning a salutary excitation in the lining membrane of the bowels, emetics may be of doubtful propriety, owing to the violence of their operation forcing the blood toward the encephalon, and endangering the augmentation of any hyperæmic condition, that may be existent there. Still, in the opinion of many, no mischief,—but rather advantage,—accrues in those very cases from the use of emetics.

Emetics differ greatly in the period that elapses between their administration and operation, and also in the degree in which they induce nausea. The sulphates of zinc and copper, for example, act speedily; whilst the tartrate of antimony and potassa, or ipecacuanha, requires fifteen or twenty minutes. This fact has given rise to a division of emetics into *direct* and *indirect*, or, in other words, into such as are conceived to act by impressing the nerves of the stomach primarily; and such as exert their agency, in the first instance, on the great nervous centres themselves.

An agent of the first class is presumed to excite such a disagreeable impression upon the nerves of the mucous coat of the stomach, that the brain immediately calls for the assistance of the different muscles concerned in vomiting, and the contents of the stomach are at once evacuated; or repeated efforts are instantaneously established to effect their expulsion.

On the other hand, an agent of the latter class is presumed to excite no immediately disagreeable impression upon the gastric nerves, but gives occasion to the act of emesis by passing into the circulatory apparatus of the stomach; impressing the nerves distributed to the lining membrane of the blood-vessels; or reaching the brain, and making its first impression upon that organ; and the fact that many substances,—as the tartrate of antimony and potassa,—which, as regards its agency on the stomach, is equally soluble with the sulphates of zinc or copper,—require such a length of time before their effects are produced, compared with those last salts, is favourable to the latter opinion: only one other view could indeed be indulged, and it is sufficiently difficult of comprehension;—that the tartarized antimony requires to make a more protracted impression on the gastric nerves, than the salt of zinc; yet how this can be effected by a solution, capable of such ready absorption, is by no means clear.

The rapid emetics, as a general rule, excite the least nausea, and their action is soonest over. The vegetable emetics are generally attended with more nausea than the mineral; although the tartrate of antimony and potassa, which requires about the same time before its operation commences, is considerably nauseant, and is more frequently employed to excite nausea, where such agency is demanded, than any other substance belonging to the class. The effects of substances, which require time for action, supervene more gradually, and continue longer. As a general rule, too, the rapid emetics are not productive of much retching, when compared with the others; and hence a judicious selection of a particular emetic for a special morbid condition, or to fulfil a certain indication, may be important. Where the object is simply to evacuate the contents of the stomach, a rapid emetic, and one that is neither accompanied, in its action, with nausea nor retching, is indicated. On the other hand, where a powerful nervous impression has to be made, one of an opposite character is demanded. Hence it is, that if a noxious substance be taken into the stomach, recourse is had to the sulphate of zinc or the sulphate of copper; whilst, in an attack of intermittent, where we are desirous of powerfully impressing the nervous system, the tartarized antimony, or ipecacuanha, or a combination of both, is selected.

When an emetic is given for the purpose of simply evacuating the contents of the stomach in disease, fluid—as warm water, or warm chamomile tea, or mustard and water—may be used, especially after each act of vomiting, for the purpose of preventing retching. The fluid must, however, be allowed in moderation, and, where a soluble poisonous article has been taken, but little should be permitted, unless it can be removed from the stomach, by the stomach-pump, immediately after it has been swallowed, or is likely to be evacuated at once under the action of an emetic. Hence, dry vomiting is advised in such cases. Where the tartrate of antimony and potassa is administered to children as an emetic, it may be well to allow the child to suck or drink before the operation comes on, as the salt, it is asserted, has been found to produce poisonous effects, when taken on an empty stomach.

If the object of the practitioner be to excite a new nervous impression, the greater the amount of retching, within due limits, the better. At times, emetics not only produce emesis, but they excite violent catharsis; or they may induce the latter effect without the former. In such cases, a few drops of laudanum have succeeded in restricting their operation to the stomach. In very irritable individuals, too, the emesis may go on to an inordinate extent, so as to exhaust by the repeated retching and vomiting. Carbonic acid, as contained in soda-water—or as given off by the union of tartaric acid and carbonate of soda,—or opium, or some rubefacient to the epigastric region, may be required to check it.

Reference has been made to the evils resulting from the repeated employment of emetics as regards the gastric functions, as well as to the mischief they may induce in particular states of the system. One other inconvenience resulting from them,—or rather, said to result from them, but of which the author has not seen an example,—is that of inflammation of the extremities, followed by gangrene. M. Barbier—an eminent French writer on Therapeutics—has cited the following case:—A woman, of a constipated habit, had used many means for producing catharsis, but ineffectually, when a surgeon to whom she applied, administered a violent preparation, which operated both upwards and downwards. Cramps, convulsions of the limbs, and great anguish supervened. Immediately afterwards, she was attacked with severe lancinating pains of the extremities, and ecchymoses appeared on different parts of the body. Gangrene attacked the cartilaginous portion of the nose, the lower lip, the skin of the chin, the points of two toes of the right foot, and the great toe of the left, all of which successively dropped off.—To this case Barbier adds one of his own. A woman, of the Faubourg d'Amiens, having procured a cathartic remedy from an herbalist, was attacked, after taking it, with incessant vomiting and purging, which rapidly reduced her strength. She was taken to the Hôtel-Dieu. Next day, the point of the nose, the ears, and the cheeks became of a deep violet hue, and soon afterwards the same colour spread over the feet and the hands; and gangrene rapidly attacked all these parts. She lost one of her feet, and several toes of the other.

These cases do not seem to prove incontestably, that the gangrene was dependent upon the use of the emetics. The effects may have been coincident, instead of consequent; and if any such evil were to be apprehended from them, we ought assuredly to possess a greater number of examples.

Therapeutical Application of Emetics.

After this full investigation of the general effects consequent on the administration of emetics, their therapeutical application to particular diseases will be intelligible.

In intermittent fevers.—In intermittent fevers, they are employed with two objects,—either to excite a powerful nervous impression, or to simply evacuate the contents of the stomach; and, according as the practitioner has one or other of these objects in view, he selects his particular emetic accordingly.

For exciting a powerful nervous impression, one, which produces much nausea and vomiting, is, as already inculcated, to be preferred; whilst if simple evacuation be desirable, it matters not how trivial the nausea or disorder may be. Practitioners, however, generally have recourse to the tartrate of antimony and potassa, and ipecacuanha, singly or combined. The latter is perhaps the more certain agent; and it has the advantage, that no very great attention is required to the dose,—sixty grains not usually producing more effect than thirty.

Where the object is to arrest the paroxsym of an intermittent, the emetic should be exhibited a short time before the cold stage is expected; and should it even not have the effect of completely preventing the fit, it may essentially mitigate it.

The first impression, made by an emetic of antimony, or of ipecacuanha, is one of diminished action; the second is one of equalization; so that although the former operation might appear inappropriate in a case of diminished action, like that of the cold stage of an intermittent, the latter might be decidedly advantageous; and this latter, it would seem, predominates over the former, inasmuch as no evil is found to result from the employment of emetics in the cold stage. Even in those pernicious intermittents,—the *febres algidæ,* as they have been termed,—in which reaction, if established at all, is so with difficulty, they have been found decidedly useful. In such cases, emetics, which produce the equalization without the depression, are obviously indicated—as sulphate of zinc, or sulphate of copper;—but those of the indirect kind have been exhibited with impunity, and even with advantage.

In the hot stage, emetics have likewise been given, but they seem to make less impression where all is exaltation, and they are obviously not as much indicated as when the action is to a less extent,—although nauseants may be most useful.

The truth is, that, during the paroxysm of an intermittent, it is not generally necessary to do much. The management on general principles is alone necessary;—*hot* fluids being prescribed in the cold stage; *cold* in the hot; and *tepid* in the sweating.

In the state of apyrexia, emetics prepare the way for the administration of tonics, which are thus enabled to come into immediate contact with the lining membrane of the stomach, and to exert their appropriate agency on it, and, through it, on the rest of the nervous system. In all periods of the affection, a gentle emetic, given merely to remove morbid secretions, may be advantageous, but their repeated use must be avoided.

In remittent fevers.—In remittent fevers, which are commonly accompanied by more or less excitation in the lining membrane of the stomach and intestines—especially of the upper portions—active emetics are not advisable; but gentle evacuants may be administered not only without detriment, but with advantage. Their repeated use, however, in such cases, is apt to augment the irritation, already existing in the mucous membrane of the digestive tube, and to increase the sensibility of that of the stomach in particular.

In fevers in general.—From the equalizing effect of emetics, they may be used at the commencement of almost all fevers with advantage; and, at times, they would appear to cut short the complaint, although probably much less frequently than has been imagined.

In cases of *ephemera,* which most frequently occurs in children, but, at times, in adults also, and is dependent upon gastric disorder, produced by errors in diet, emetics are obviously indicated, and, by removing the cause of the fever, may put an end to the febrile action; but it is not easy to cut short a continued fever, after it has gone on for some days, by this or by any other plan. Such, at least, has been the result of the author's observation, and it accords with that of others, whose opportunities have been extensive. In almost all fevers, termed *continued*, two exacerbations in the day can be perceived;—the one about midday, and the other in the evening; and it has been conceived, that where the object is to cut short the fever, the emetic, as in the case of an intermittent, should be given a short time before the expected exacerbation, and especially before that in the evening, which is usually more marked than the other.

The *modus operandi* of emetics, in cutting short a continued fever, is the same as in the case of intermittents;—that is, by the revulsion they produce; and the equalizing influence exerted by them on the sanguiferous and nervous systems. Hence, they are occasionally advantageous in the *major exanthemata,* especially when the eruption does not appear freely and equably, but seems to be restrained or repressed, in consequence of irritation existing in some internal organ. Broussais, with the dogmatism that is too apparent in his writings, lays down a law of action, which admits of many exceptions.—"Emetics cure gastro-enteritis solely by the revulsion, and the critical evacuations which they provoke: their effect is then uncertain in mild cases; and, in severe ones, they are always dangerous, because they *never fail* to augment the inflammation, when they do not succeed in removing it."—Prop. 287. And, again, "Emetics, purgatives, and tonics, which act by revulsion, effect only temporary cures in chronic gastritis and gastro-enteritis, and render the radical cure more difficult." Prop. 349:—'propositions,' which must be regarded as mere assertions emanating from a distinguished mind, but not on that account to be received as authority in the absence of evidence.

It need scarcely be said, that in the course of continued fever, morbid secretions must take place from the lining of the alimentary tube as in remittents and intermittents, but as these can generally be evacuated by cathartics, they are usually employed to the exclusion of emetics.

In inflammations.—In the different phlegmasiæ, emetics are much used. In some, however, they are more effective than in others. In *laryngo-tracheitis* or croup, they are given in very different stages of the disease, to fulfil different indications,—and with equal propriety. At the commencement of an attack, both of spasmodic and inflammatory croup, an emetic, by exciting a salutary revulsion, and equalizing the circulation, frequently puts an end to the inflammation; and even if the disease has made some progress, it is a valuable agent, after blood-letting. Accordingly, it is one of the remedies most employed in the early stages of croup.

It is equally indicated after the albuminoid secretion has been thrown out from the membrane; but it must obviously be a matter of extreme difficulty, by any agency, to cause the detachment of the false membrane, and its expulsion through the narrow chink constituting the rima glottidis, when it has formed in the trachea; yet the best expectorant agency that can be exerted, is effected by the succussion, which the action of an emetic occasions.

The same remarks apply equally to the inflammation of the lining membrane of the larynx, that constitutes laryngitis.

In *amygdalitis* or inflammation of the tonsils, as well as in *pharyngitis* and *œsophagitis*, the same good effects are produced by the revellent and equalizing agency of emetics; and when suppuration has supervened, and the abscess is seated so low down in the pharynx or œsophagus, that it cannot be reached by the instrument of the surgeon, the operation of an emetic may cause it to break. With this view, one of the direct emetics may be prescribed. No great impression on the nervous system is needed. The expulsive efforts are alone required; and the sulphate of zinc, or the sulphate of copper, is capable of fulfilling every indication. In the malignant varieties of *cynanche*, which so often accompany scarlatina, emetics are frequently administered. Much curative influence cannot, however, be expected from them, except at the very commencement of these affections; but at a subsequent period, they may be given with the view of removing the viscid secretions, which excite so much annoyance.

In diseases of the chest.—Emetics are much employed in different diseases of the chest. In *pneumonia*, they are not often used before the activity of vessels has been diminished by the proper antiphlogistic remedies; but when the inflammation has been somewhat subdued, their equalizing and revulsive influence becomes strikingly apparent. They favour the discharge of the bronchial secretions, by the succussion they communicate to the lungs; and, for this reason, they are employed with considerable benefit in *chronic bronchitis*.

They are, likewise, extremely beneficial in *nervous cough*, *hooping-cough*, and *asthma*. These diseases appear to be dependent upon a morbid condition of the nerves of the respiratory organs—the pneumo-gastric especially—which modifies the contractility of the muscular fibres, that surround the minute bronchial ramifications; and this state of the nerves is generally perhaps connected with more or less derangement of the parts of the cerebro-spinal axis, whence they originate. Hence, the utility of producing a revulsive effect by means of these or other agents. Expectoration is also favoured by them, in the manner just mentioned, and it has been long remarked, that those children suffer least from hooping-cough, who eject the contents of the stomach during each fit of coughing.

In diseases of the encephalon.—It is in head affections, that the use of emetics might seem most doubtful. In *encephalitis*, they are generally esteemed inadmissible; and, as the pain in the head is almost intolerable, their operation can hardly fail to aggravate the symptoms, notwithstanding their revellent and equalizing tendency. The same remarks are applicable to their employment in *apoplexy*. The violent efforts,—forcing the blood with greater impetus to the head by the arteries, and retarding its return by the veins,—appear inappropriate, in cases in which hyperæmia already exists in the encephalon, yet their revellent properties would seem to have rendered them useful in *ophthalmia*, when blood-letting, counter-irritants, &c., had been prescribed, and the disease had, notwithstanding, remained stationary. In these very cases, the same substances, employed so that their operation may be confined to exciting nausea, are amongst our most valuable remedies, and not in these affections only, but in every variety of phlegmasia.

Amaurosis.—Amaurosis is said to have been beneficially treated by emetics, but much reliance obviously cannot be reposed in them, when the retina, or the optic nerve, or the part of the brain in which the optic nerve arises, is affected with paralysis. Impaired or depraved vision often occurs sympathetically from disorder of the digestive functions; at other times, it is owing to lesion of the eye itself, or of the cerebral part of the organ of vision; hence the affection, termed *myodesopsia* or *muscæ volitantes*, is symptomatic of one or other of these morbid conditions; and hence the various hallucinations, illusions or waking dreams, which occur in diseases of the encephalon, as mania and hypochondriasis; but which are often produced in persons of sound mind, whose nervous systems are unusually impressible, and easily acted upon by irritations in the stomach, or elsewhere.

Where the primary mischief, in such affections, is in the stomach or intestines, emetics are more likely to afford relief, than when the depravation is seated originally in the encephalon.

In bubo and orchitis.—In certain local affections—as *bubo*, and *orchitis*—the revellent action of an emetic is often most beneficial. The inflammation may have been vigorously attacked by the proper antiphlogistic measures, yet the swelling may remain stationary. If a powerfully revellent nervous impression be now made, by exciting emesis, the swelling will frequently disappear.

In the very early stages of orchitis, or bubo, the revulsion, thus produced, is by no means as efficacious. The excited state of vessels generally predominates too much to be broken in upon by any impression upon the nervous system. This state of vessels must be reduced by antiphlogistics, and then emetics may be had recourse to with full advantage.

In phthisis pulmonalis.—In phthisis pulmonalis, emetics were at one time considered the best remedies; and, according to one writer, (*Young,*) a majority of the cures of phthisis have been effected by them or by nauseating agents. This idea probably originated from the good effects observed to follow a sea voyage, which is usually accompanied by sea-sickness; but the fallacy, in this case, consists, in referring that to the nausea, which may be produced by the greater equability of temperature at sea, and by the new impressions made upon the mind and nervous system of the voyager, through the altered barometrical, hygrometrical, thermometrical, electrical and other conditions of the atmosphere, and by the new scenes in which the patient is placed. Even in the early stages of phthisis, when alone any course of medication can be expected to be effective, emetics are, at the present day, but rarely had recourse to. In the later periods of the disease, they are not only useless, but add to the existing irritation and debility.

In diseases of the alimentary canal.—In gastritis, and enteritis, emetics are manifestly not needed, and would probably be injurious; nor would they appear to be indicated in *spontaneous vomiting;* but, as diarrhœa is often kept up by irritations in the intestinal canal, and requires the administration of a cathartic to remove them; so vomiting may suggest the use of an emetic; and even when the spontaneous vomiting has persisted after the contents of the stomach have been evacuated, the new action, induced by an emetic, may break in upon the disorder of function, and remedy the evil.

In *dyspepsia,* emetics are occasionally prescribed, but they must be employed with caution. A gentle emetic removes indigestible matters and morbid secretions; and produces an excitation in the stomach, which may be salutary; but repeated emetics, as has been previously shown, injure the tone of the organ, develope its sensibility, and augment the very affection, for the removal of which they were administered.

In *cholera*—both of the indigenous, and foreign variety—gentle emetics are prescribed by some practitioners, and, as means for the removal of morbid secretions, they may be useful;

but it is not clear, that they ought to be regarded as of much efficacy in affections that are dependent upon an irritated or excited state of the gastro-intestinal mucous membrane, and which yield with the subsidence of the inflammatory irritation, or terminate unfavourably, when the morbid affection of the membrane in general, and of the exhalents in particular, is excessive.

In cases of *malignant cholera*, the stimulating emetics—as mustard—have been most frequently employed,—the inflammatory irritation of the mucous membrane, in these malignant cases, being occasionally diminished by gentle excitants, as we have seen it may be in affections of the mucous membranes in general, when the over-distended state of extreme vessels is the prominent pathological lesion. A main part of the benefit, however, accruing in such cases, is probably derived from their revulsive operation,—the chief pathological mischief being usually situate lower down in the tube. It has, indeed, been a question, with some therapeutists, whether advantage might not be derived, in these unfortunate cases, from remedies that might even inflame the lining membrane of the stomach; but such a harsh plan of revellent treatment could, of course, be scarcely admissible.

In *diarrhœa* and *dysentery*, where the irritation is seated lower down in the tube, an emetic may produce good effects as a revulsive; but, in the latter disease, the violence of the inflammation must be previously subdued by appropriate agents. It would seem, too, that in certain cases of constipation, accompanied with spasmodic constriction of the muscular coat of the intestines, emetics, administered after blood-letting, have relaxed the spasm, so that the bowels have been relieved, or gentle cathartics have afterwards been sufficient.

In dysentery, the seat of which is chiefly in the lining membrane of the large intestine, the revellent and equalizing effects of emetics are beneficially manifested.

In rheumatism and gout.—In acute rheumatism, and gout, emetics are not much used, although occasionally their operation —as revellents and equalizers—may be advantageously exerted. In the latter disease, connected, as it is, with considerable gastric disorder, their use might seem to be more especially indicated; and in both diseases they may be demanded for the removal of morbid secretions, or of undigested matters from the tube,—a result, which can generally, however, be accomplished by the use of gentle cathartics.

In hemorrhages.—After what has been said of the general mode of action of emetics, and of their application to the ordianry phlegmasiæ, their agency in hemorrhages will be apparent. In *epistaxis*, they cannot be required, and their employment in *apoplexy*,—it has been already seen,—is a more than questionable measure. The same, it has been thought, may be said of *hæmoptysis*. Although their equalizing and revulsive operation might act advantageously, it has been conceived, that the activity they occasion in the vascular movements, might more than compensate for their salutary agency. Yet, it has not been found, that hæmoptysis, symptomatic of phthisis, has recurred, or been increased at sea during the retching of sea-sickness. (See the author's *Elements of Hygiène*, p. 183; Philad. 1835.) In such cases, nauseating doses are recommended, which, as before shown, produce an effect of a directly opposite character, so as to give occasion to their being classed amongst agents, that diminish action.

In *hæmatemesis*, emetics have been recommended by some, with the view of removing the accumulations of blood, which form in the stomach; and, in this respect, they may be of service. The hemorrhage, in these cases, is generally venous, and takes place by diapedesis or transudation;—often owing to visceral engorgement, which prevents the blood from circulating freely in the engorged organ, and occasions irregular congestions in other parts. In such cases, emetics ought to be administered with caution. In the wards of the Philadelphia almshouse, we annually meet with cases of hæmatemesis, melæna, and epistaxis, occasioned by engorgement and induration of the liver or spleen, especially the latter, acquired in malarious districts. The proper treatment of the hemorrhage necessarily merges in that of the primary affection on which it is dependent.

In cases of simple hæmatemesis, the action of the stomach, induced by an emetic, may occasion the removal of the venous congestion, and the pressure of the muscular coat of the viscus on the vessels exhaling the blood may tend to contract their dimensions, and to arrest the flow, somewhat, perhaps, in the manner that the hemorrhage is arrested in the next variety to be considered.

Uterine hemorrhage may occur prior to, during, and subsequent to, the delivery of the child. In all cases, it is produced by a discharge from the uterine vessels. The old idea, universally entertained, was;—that the vessels of the mother pass directly to the placenta, and pour their blood, by open mouths, into the maternal portion of that organ. Under this view of the subject, hemorrhage would be produced by a rupture of the maternal vessels. Some observers have satisfied themselves, that there is no direct communication between the uterine vessels and the placenta, but that these vessels coast along the uterine parietes in a direction parallel to the placenta,—having, however, portions scooped out of their sides, which portions are closed, either directly or indirectly, by the placenta. Under this view, there can of course be no maternal and fœtal placenta; the whole is fœtal, and hemorrhage arises from the detachment of the decidua or of the placenta from the apertures in the uterine vessels. Whatever, therefore, induces contraction of the uterus, occasions the reapplication of the placenta, or of the body of the child to the vessels whence the hemorrhage proceeds, and arrests it. These remarks apply, of course, only to hemorrhage occurring prior to, or during delivery, and then only to cases in which the placenta is situate elsewhere than over the os uteri.

In uterine hemorrhage following the delivery of the ovum, the hemorrhage is arrested by causing the uterus to contract upon itself, and thus to obliterate, as it were, the maternal vessels; and emetics, which call into action the abdominal muscles, facilitate this result, although they are but rarely had recourse to, seeing, that the obstetrical practitioner has more effectual means for attaining his object.

In jaundice.—In jaundice, dependent—as it often is—on some impediment to the flow of bile along the biliary ducts into the duodenum, and especially when produced by a gallstone, the inverted action and the succussion, induced by the operation of an emetic, are often beneficial, and the same remark holds good in cases of *cholelithus* or *gallstone* without jaundice. Here, an emetic should be selected, whose operation is preceded by nausea —as tartar emetic or ipecacuanha—the relaxing influence of which is first felt, and this is immediately succeeded by the propulsory efforts, which are, at times, successful in causing the calculus to clear the biliary passages. It has been properly remarked, however, that emetics are more advantageous and safe in the early than in the later periods of jaundice, when there is reason to believe in the existence of organic disease of the liver; and also, that they should be used with caution, when there is evidence of distension of the gall-bladder,—indicated by a tumour felt on pressing the right hypochondrium. Under such circumstances, the operation of an emetic has been known to occasion rupture of the gall-bladder and fatal peritonitis. (*Stokes.*)

In the neuroses.—In *mental alienation*, emetics were, at one time, much advised, and some of the most noted remedies possessed properties of this kind. They are not given at the present day, unless symptoms should arise in the course of the disease to indicate their administration. In the cases in which they are presumed to have exerted a salutary agency, this was probably accomplished less by their acting as evacuants, or through modifications induced in the circulation, than by the new impression made by them upon the nervous system. Hence, they are occasionally used in mania to interrupt intense abstractions. When the insane obstinately determines to retain his urine and fæces, an emetic often succeeds in breaking in upon the determination; and the same applies to those who are affected with *delirium tremens*, in which disease emetics have been wholly relied on by some. (For the author's views on this subject see his *Practice of Medicine*, ii. 348, Philadelphia, 1842.) In all such cases, emetics have to be given in larger doses than usual. The encephalon being in a state of excitement, and employed in its own acts, is less affected by impressions made on other organs, and, consequently, requires a larger amount of the impressing agent; but if the energy of the system be first reduced by a copious abstraction of blood, then the ordinary dose of the emetic may produce its accustomed effects.

In *hypochondriasis*, which is an encephalic disorder, accompanied generally with much gastric derangement, an occasional emetic often acts beneficially, by exciting a new action in the nervous system, and giving an impulse to functions carried on with unusual torpor.

In *epilepsy*, and in the *convulsions of children*, emetics are not only excellent prophylactics, but valuable curative agents. Where organic mischief does not exist, these diseases are usually induced by great mobility, or impressibility of the encephalon, developed by irritation in some other part of the system, and especially in the digestive tube. Often, this is produced by indigestible diet, or by morbid secretions, and when the prodromic or premonitory symptoms of the attack are present, a timely emetic may prevent the paroxysm, by removing the cause, and exciting a new nervous impression, as in the case of intermittents.

The same kind of revulsion is, at times, salutary in *hysteria*, as well as in the different forms of *neuralgia*. The impression of the emetic is powerfully exerted on the stomach, and thence irradiates to every part of the nervous system, and, by equalizing the nervous distribution or influx, detracts from its intensity in any given point.

In dropsy.—Lastly, emetics have been frequently exhibited in the different varieties of dropsy, and they are calculated to act as promoters of absorption in such cases;—not so much in consequence of any increased action of the exhalents of the lining membrane of the stomach, which they may occasion, as by their revulsive operation. Dropsies, as will be seen, have been known to disappear under powerful mental emotions, and not only dropsies, but depositions of solid materials, and we can, therefore, understand, that these affections may diminish under the nervous derivation excited by an emetic. They cannot, however, be repeated sufficiently often to produce much salutary influence, for fear of injuring the tone of the stomach; and, accordingly, they are but rarely employed in the treatment of hydropical affections.

Such are the diseased conditions in which emetics are especially serviceable. It is obviously impossible to specify every variety of organic lesion in which they may be salutary. Enough has been said of their general properties, and particular applications, to suggest the cases in which their administration may be indicated.

SPECIAL EMETICS.

a. Direct Emetics.

1. ZINCI SULPHAS.—SULPHATE OF ZINC.

Sulphate of zinc occurs in commerce in an impure state, under the name of *White Vitriol*, by which, indeed, it was long known in medicine. The salt, however, always contains iron, and commonly copper and lead; and therefore, for pharmaceutical purposes, it is directed to be prepared by the union of oxide of zinc and sulphuric acid.

Sulphate of zinc is in colourless crystals, which effloresce on exposure to the air. It is wholly dissolved by water; by $2\frac{28}{100}$ of its weight of cold water, and less than its own weight of boiling water. It is insoluble in alcohol. The solution in water affords with ammonia a white precipitate, which is redissolved by the alkali in excess. It also yields white precipitates with chloride of barium, ferrocyanuret of potassium, and sulphohydrate of ammonia.

Sulphate of zinc, which is tonic in small doses, is a rapid and safe emetic; and hence is given, when it is desirable to evacuate the contents of the stomach speedily, as when poison has been taken. The dose for this purpose is from ten to thirty grains. In excessive doses it acts as an irritant poison.

2. CUPRI SULPHAS.—SULPHATE OF COPPER.

The *Sulphate of Copper*, *Roman* or *Blue Vitriol*, or *Bluestone*, used in the United States, is formed by a direct combination between old scrap copper and sulphuric acid. This is always made on the large scale; and hence it is not in the list of preparations of the Pharmacopœia of the United States, but in that of the materia medica. It occurs in rich blue crystals, which are wholly soluble in water, and slightly efflorescent in the air. It is insoluble in alcohol. Ammonia throws down, from a solution of the salt in water, a precipitate, which is entirely redissolved when the ammonia is added in excess. It dissolves in about four parts of water at 60°, and two parts of boiling water.

Like sulphate of zinc, sulphate of copper is, in very small doses, a tonic; and in larger an emetic. It is, however, much more active, and in considerable doses is a highly acrid and corrosive poison.

Its dose, as an emetic, is from two to five grains, given in water; but it is less safe than the sulphate of zinc.

b. Indirect Emetics.

1. ANTIMONII ET POTASSÆ TARTRAS.—TARTRATE OF ANTIMONY AND POTASSA.

Tartrate of Antimony and Potassa, *Tartarized antimony, Emetic Tartar, Tartar Emetic*—in the southern states of the Union erroneously termed *Tartar*—is, perhaps, more frequently used as an emetic than any other agent.

In the Pharmacopœia of the United States (1842) it is directed to be formed as follows:—Take of *Sulphuret of Antimony*, in fine powder, ℥iv; *Muriatic Acid*, ℥xxv; *Nitric Acid*, ʒij; *Water*, a gallon. To the acids mixed in a glass vessel, add gradually the sulphuret of antimony, and digest the mixture with a gradually increasing heat, till effervescence ceases; then boil for an hour. Filter the liquor when it has become cool, and pour it into the water. Wash the precipitated powder frequently with water, till it is wholly freed from acid, and then dry it. Take of this powder, ℥ij; *Bitartrate of Potassa*, in very fine powder, ℥iiss; *Distilled water*, f. ℥xviij. Boil the water in a glass vessel; add the powders previously mixed together, and boil for an hour; filter the liquor whilst hot, and set it aside to crystallize. By further evaporation, the liquor may be made to yield an additional quantity of crystals, which should be purified by a second crystallization.

Tartrate of antimony and potassa consists of tartrate of antimony and tartrate of potassa; and the object of the above process is first to form sesquioxide of antimony, and then to saturate the excess of acid in the bitartrate of potassa with it. It is in transparent crystals, which become opaque and white on exposure to the air. As met with in the shops, it is generally in powder, and, when pure, is perfectly white. Dr. Pereira, however, remarks, that some ignorant druggists prefer a yellowish-white powder: and he was informed by a manufacturer of the salt, that he was obliged to keep two varieties,—one white, the other yellowish-white,—to meet the demands of his customers. The yellow hue is owing to the presence of iron.

It is often adulterated with bitartrate of potassa; and it has been found that it may contain 10 per cent. of it, and yet dissolve in the proper quantity of water, (*R. Phillips.*) It is wholly soluble in 14 or 15 parts of water, (*Pereira;*)—according to the Pharmacopœia of the United States, in 20, at 60° Fahr. Uncombined bitartrate of potassa is detected by adding a few drops of a solution of carbonate of soda to a boiling solution of the antimonial salt. This causes a precipitate, which is immediately redissolved, if bitartrate of potassa be present. (*Hennel,* cited by *Phillips.*)

When tartrate of antimony and potassa is taken in very large doses, it acts as a powerful irritant poison, causing directly inflammation of the stomach and intestines. It is likewise an irritant when applied to the cutaneous surface. Its nauseant and emetic properties alone fall under consideration in this place.

As a nauseant, it is constantly given in febrile and inflammatory affections, in such doses as to keep up the action of sedation sufficiently long to break in upon the chain of morbid associations. For this purpose, it is prescribed in the dose of from ⅙th to ½ a grain every two or three hours; carefully regulating the quantity and the periods so as to prevent the supervention of vomiting.

As an emetic, it may be given alone, or in union with ipecacuanha—one or two grains of the tartrate to fifteen or twenty grains of the latter. When administered alone, it should be in divided doses;—six grains, for example, being dissolved in four ounces of water, and a fourth part given every fifteen minutes until it operates;—the action, in this case, as in that of every other emetic, where it is desirable to evacuate the contents of the stomach freely, and there is no danger of dissolving any noxious matter that may be contained in it, being aided by drinking freely of warm water, or of warm chamomile tea. For reasons already assigned, it is rarely prescribed, however, where any poisonous agent has been taken,—recourse being had to direct emetics.

Being devoid of taste, it is a very convenient emetic in the diseases of infancy, in which it is advisable to give it in divided doses until vomiting is induced; and it is doubtless the main agent in some of the nauseating and emetic preparations so commonly used in such cases in domestic practice.

VINUM ANTIMO'NII, ANTIMONIAL WINE.—(*Antim. et Potass. Tartrat.* ℈j: *Vini,* f. ℥x.) Each ounce of the wine contains two grains of the tartrate. Antimonial wine is commonly kept in families, and it has the advantage, which a watery solution has not, of keeping well. It is readily taken by children as wine. It is not well adapted, however, as an emetic, for the adult. If we regard the ordinary dose of the tartrate of antimony and potassa to be two grains, it would require one ounce of the wine, which might be injurious, and in no circumstances could offer advantages over the aqueous solution. Accordingly, it is rarely prescribed to adults. To children, under five years of age, the *vinum antimonii* is generally given in the dose of a tea-spoonful, repeated every fifteen or twenty minutes until it acts.

2. IPECACUAN'HA.

Ipecacuanha is the root of the *Cephæ'lis Ipecacuan'ha;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Rubiaceæ,—Cinchonaceæ (*Lindley*); a small shrubby plant, which grows in Brazil, in moist, shady situations, between the 8th and 20th parallels of south latitude. It is said, also, to occur in New Granada, and in some of the West India islands. The roots are gathered at all seasons of the year, but especially from January to March inclusive.

The amount on which duty was paid in England, in 1841, was 9,623 lbs.; but a singular fluctuation, as to quantity, is presented by the table of imports for the last few years, which is as follows (*Pereira*):

In 1834,	9,038 lbs.	In 1838,	12,426 lbs.
1835,	7,469	1839,	7,453
1836,	11,437	1840,	6,483
1837,	11,435	1841,	9,623

As imported, ipecacuanha root consists of the proper knotty root; the thinner, woody cylindrical portion by which it is attached to the stem, and frequently a part of the trailing portion of the stem also, (*Christison.*) The annulated or ringed portion —the *Radix Ipecacuanhæ annulatæ,* of continental writers—is the most active part, and, therefore, ought alone to be used by the apothecary.

The root—as we meet with it—is of about the thickness of a small goosequill, and of a length varying from two inches to seven; contorted, and presenting numerous annular grooves, which give it a characteristic, knotted or ringed appearance. The colour varies, from brownish, reddish-brown, grayish-brown to gray. Its substance consists of two parts—the one constituted of the bark, the other of the meditullium,—the proportion, in 100 parts of good ipecacuanha, being 80 of the former to 20 of the latter. The meditullium is nearly inert, and as it is pulverizable with more difficulty than the cortical portion, when the pulverization is effected in a mortar, it may happen, that the portion which may remain last in the mortar, possesses scarcely any medicinal property. Generally, however, at the present day, it is reduced to powder, on a large scale, by grinding, so that this separation is not observable.

The powder of ipecacuanha has a nauseous odour, and on some persons produces a peculiar effect, giving rise to sneezing, cough, dyspnœa, and all the symptoms of *catarrhus æstivus* or *hay asthma*, as it has been termed. These symptoms pass off after a time, and generally with a copious secretion from the bronchial tubes. It would appear, that small particles of the powder inhaled with the air induce bronchitis, and at the same time affect, in a peculiar manner, the ramifications of the pneumogastric nerves, so as to give occasion to this disorder. A friend of the author suffered excessively whenever he had occasion to handle the powder, and especially if he were present whilst the pulverization was going on. Its taste is bitter, subacrid, mucilaginous, and very nauseous.

Ipecacuanha yields its virtues to water, and still more to alcohol, pure or diluted. The stronger wines equally extract them, and hence most of the pharmacopœias have a wine of ipecacuanha. The virtues reside essentially in an active principle, which was first separated by M. Pelletier in 1817, to which he gave the name *Emetine*—now often termed *Emetia*. Pelletier's analysis was as follows.

	Brown Annulated Ipecacuanha.		Red do.
	Cortex.	Meditullium.	Cortex.
Emetia,	16	1.15	14
Odorous fatty matter,	2	traces	2
Wax,	6	——	—
Gum,	10	5.00	16
Starch,	42	20.	18
Ligneous matter,	20	66.60	48
Non-emetic extractive,	—	2.45	—
Loss,	4	4.80	2
	100	100.00	100

The emetia in this analysis is, however, the impure, and it was subsequently found by Pelletier, that the root contains only about 1 per cent. of the pure.

Such are the characters of the officinal ipecacuanha. Other ipecacuanhas have, however, been described, and it is not surprising, that many roots should have been substituted for the officinal variety. In would appear, however, that they are but little known in the trade of this country or of Europe. (*Christison.*) It is, consequently, not necessary to dwell upon them.

The *striated ipecacuanha, black ipecacuanha,* is from the *psycho'tria emet'ica,* a native of Peru, which was, at one time, supposed to be the source of the true ipecacuanha. This would appear to be sometimes imported into continental Europe, and to be confounded with the dark specimens of the true ipecacuanha. Its joints, however, are longer; and the surface is striated longitudinally. Pelletier found it, on analysis, to yield 9 per cent. of an emetic extract, similar to impure emetia.

White or *amylaceous ipecacuanha* is obtained from different species of *Richardso'nia,* which inhabit open plains in Brazil. It resembles most the true root, but is distinguished by having fewer and shallower annular fissures, larger joints, and the central woody portion being proportionally much thicker. Pelletier found it to contain 5 or 6 per cent. of an emetic extract, like impure emetia, and a large quantity of starch. Another variety of white ipecacuanha is obtained in Brazil from the *ionid'ium ipecacuanha,* or *vi'ola ipecacuanha.* It is much thicker than the true ipecacuanha, being sometimes as large as the little finger, having only a few transverse fissures, distinct joints or knots, and a thick woody interior. Pelletier found this root to contain about 5 per cent. of emetic extract similar to impure emetia.

As an emetic, ipecacuanha acts like tartrate of antimony and potassa. It is perhaps the safest and most certain of the indirect emetics, and although it is supposed to be—in large doses—an acro-narcotic poison, the author has never known a case, in which such symptoms have presented themselves. Emetia, when injected into the venous system of a dog, excites vomiting in the first instance, and afterwards coma, which ends fatally. (*Magendie.*)

To produce full emesis, it is often associated with tartrate of antimony and potassa, as remarked under that article; but it is frequently given alone. The common mode is to administer about 20 grains of the powder in warm water; and to repeat this quantity every fifteen or twenty minutes until it operates; drinking freely of warm water or of warm chamomile tea.

When the object is to excite nausea, from one to three grains may be prescribed at such intervals as may be deemed advisable. This dose will generally be sufficient as an emetic for children of two or three years old. When it does not operate on the stomach, both it and other emetics are apt to affect the bowels; and not unfrequently they all have an emeto-cathartic operation.

VINUM IPECACUANHÆ, IPECACUANHA WINE.—(*Ipecac.* contus. ℥ij; *Vini*, Oij.) This preparation may be used in the same cases as the antimonial wine, and there may be cases in which it may be proper when the former is not; for example, the antimonial wine, in particular persons, may produce griping and intestinal irritation, whilst the wine of ipecacuanha may not; and conversely. It is a very safe emetic for children. The dose to the adult is one fluid ounce; to the child of from one to two years of age a tea-spoonful or a fluidrachm.

SYRUPUS IPECACUANHÆ, SYRUP OF IPECACUANHA.—(*Ipecac.* in pulv. crass. ℥j; *Alcohol. dilut.* Oj; *Syrup*, Oij. Prepared either by maceration or by the process of displacement.) From f. ℥j. to f. ℥ij. of this preparation will act as an emetic, but it is not much used. It is more convenient for children, on whom it operates in the dose of from f. ʒj to f. ʒij.

EMET'IA.

Emet'ia, *Em'etine*, *Emeti'na*, *Em'eta*—as already remarked—is the active principle of Ipecacuanha, which was first separated from it in 1817 by Pelletier, of Paris. It is not officinal in the Pharmacopœias of Great Britain, or in that of the United States, but has been received into many continental Pharmacopœias,—as the Parisian, Batavian, Hannoverian, &c. There are two varieties of the active principle, which bear the same relation to each other as moist sugar does to the crystallized. (*Magendie.*) One of these is termed the *impure*, the other the *pure*. To obtain the former, powdered ipecacuanha is digested with ether to dissolve the fatty matter, whence it derives its disagreeable odour, and which possesses no emetic virtue. When the powder yields nothing more to the ether, it is exhausted by means of alcohol; the alcohol is then evaporated in a water-bath, and the residue dissolved in cold water. It thus loses some of the wax, and a little of the fatty matter that still adhered to it. It is then mixed with carbonate of magnesia, whereby it loses its gallic acid, is redissolved in alcohol, and evaporated to dryness.

To obtain pure emetia, magnesia is substituted, for the carbonate used in the process just described, in such quantity, that the acid existing in the liquid may be neutralized, and that which is associated with the emetia be separated from it. The precipitate of magnesia and emetia must now be washed with cold water to remove the colouring matter, which is not combined with the magnesia; and after being carefully dried it must be treated with alcohol, which dissolves the emetia. The emetia obtained by the evaporation of the alcohol must then be dissolved in a dilute acid, and treated with pure animal charcoal.

After this purification it must be precipitated by a salifiable base.

Impure emetia is in the form of reddish brown, transparent scales; is almost inodorous, and of a bitter taste. It is very deliquescent, and soluble in water. Pure emetia has a white, and frequently somewhat yellowish appearance, is pulverulent, and does not deliquesce like the impure. It is but little soluble in cold water; more so in warm. It dissolves readily in ether and alcohol. With the acids it forms crystallizable compounds, from which it may be precipitated by galls, which are the best agents for obviating its effects in an overdose.

Emetia—the impure especially—has been proposed as a substitute for ipecacuanha, and with this view formulæ for officinal preparations of it have been received into many of the Pharmacopœias of continental Europe. It would not seem, however, that much advantage would result from its use, and it certainly is far more expensive than ipecacuanha in any of its forms of preparation.

The dose of the impure emetia is a grain or a grain and a half, given at intervals of fifteen or twenty minutes until it vomits; of the pure emetia, from a quarter to half a grain. (See the author's *New Remedies*, 3d edition, p. 206, Philadelphia, 1841.)

3. GILLE'NIA.

Gillenia is the root of *Gille'nia trifolia'ta, Spiræ'a trifolia'ta, Indian Physic, American Ipecacuanha, Beaumont Root;* Sex. Syst. Icosandria Pentagynia; Nat. Ord. Rosaceæ;—an indigenous herbaceous plant, which grows throughout the United States to the east of the Alleghanies from Florida to Canada, in light soils and in shady and moist situations; and flowers in June and July. The root is gathered in September.

In the valley of the Mississippi, *Gille'nia stipula'cea* grows. Its root is like that of the eastern species, and is said to possess the same properties.

As met with in the shops, the root is of the size of a small goosequill, wrinkled longitudinally, with occasional transverse fissures, and in the thicker pieces having a somewhat knotty appearance, owing to indentations on one side corresponding with prominences on the other. The chief properties are in the cortical portion, which has a bitter disagreeable taste. Its virtues are extracted by the same menstrua as ipecacuanha.

As one of its names imports, its medical virtues resemble those of ipecacuanha, for which it is substituted by some. It is not, however, much used, although said to be a mild and satisfactory emetic.

The dose of the powder is from 20 to 30 grains, repeated like ipecacuanha at intervals of 15 or 20 minutes until it operates.

4. SCILLA.—SQUILL.

Squill is the bulb of *Scilla* or *Squilla marit'ima, Sea onion;* Sex. Syst. Hexandria Monogynia; Nat. Ord. Liliaceæ; which grows on the shores of the Mediterranean—viz. Spain, France, Italy, Sicily, Greece and Africa. It is imported, both in the fresh and dried state, but much more commonly in the latter; an incentive to which is, that in England, and we believe in this country also, the duty on the dried bulb is no higher than that on the fresh.

The fresh bulb is pear-shaped, and consists of concentric lamellæ, the outer ones of which are thin, membranous and of a brownish-red colour, whilst those within are whitish, thick, fleshy and juicy.

In English pharmacy, two kinds of squill are met with,—the *white* and the *red*, the former of which is preferred. (*Pereira.*) The average weight of the bulb is from half a pound to four pounds, but they have been seen weighing ten pounds and a half. (*Christison.*)

The fresh bulb is kept in dry sand; and before drying it, the dry rind is removed; after which the bulb is cut transversely into thin slices, and dried as quickly as possible with a gentle heat.

The dried squill of the shops is in yellowish-white or white, slightly diaphanous pieces, which are brittle when dry, but generally flexible, owing to their high hygrometric property; on which account, it ought to be kept in a dry place, or in well stopped bottles.

Dried squill is inodorous; and of a bitter, nauseous, extremely acrid taste. It yields its virtues to water, alcohol and vinegar. Its best solvents are dilute alcohol and vinegar, which are consequently used in various officinal formulæ.

Squill has been subjected to analysis by different chemists; but the results have not been satisfactory, and it is not admitted, that the active principle has been isolated.

In large doses, squill belongs to the acro-narcotic class of vegetable poisons. When given to a less extent, it operates as an emetic, generally producing catharsis also. As an emetic, it is rarely prescribed, except in affections of the respiratory organs; over which—as will be shown under the head of Expectorants—it is conceived to exert some special agency. It is rarely, however, given, except in croup, to such an extent as to produce emesis; it is exceedingly uncertain in its action, and the vomiting induced by it is, at times, of the most harsh and disagreeable kind.

The dose of the powdered squill, as an emetic, is from six to twelve grains; but it is scarcely ever prescribed in this form to the adult; and to children one of the following preparations is selected. If it be desirable to nauseate by it, one or two grains may be given three or four times a day, gradually increasing the dose until the effect is induced.

TINCTURA SCILLÆ, TINCTURE OF SQUILL.—(*Scill.* ℥iv; *Alcohol. dilut.* Oij. Prepared either by maceration or by the process of displacement.) As a nauseant, this tincture may be given in the dose of 30 or 40 drops, two or three times a day. It is rarely, however, prescribed with this view, being generally added to expectorant mixtures. It is not administered as an emetic.

ACETUM SCILLÆ, VINEGAR OF SQUILL.—(*Scill.* cont. ℥iv; *Acet. destillat.* Oij; *Alcohol.* f. ℥j. Prepared either by maceration or by the process of displacement.) Two fluidrachms will usually induce nausea. The alcohol is added to prevent decomposition.

OXYMEL SCILLÆ, OXYMEL OF SQUILL. (*Mel. despumat.* ℔iij; *Acet. Scillæ,* Oij. Reduce to the specific gravity 1.32.) This preparation is occasionally given to children labouring under croup or pulmonary catarrh, and repeated so as to induce vomiting. The dose for this purpose is a tea-spoonful given every fifteen or twenty minutes.

SYRUPUS SCILLÆ, SYRUP OF SQUILL. (*Acet. Scillæ,* Oj; *Sacchar.* ℔ij.) Given as a nauseant and emetic in the same cases and doses as the last.

SYRUPUS SCILLÆ COMPOSITUS, COMPOUND SYRUP OF SQUILL, the *Mel. Scillæ Compositum,* or *Compound Honey of Squill* of the former Pharmacopœias of the United States. (*Scill.* cont.; *Senegæ* cont. āā ℥iv; *Antimon. et Potass. Tartrat.* gr. xlviij; *Aquæ* Oiv; *Sacchar.* ℔iiiss. The water is poured upon the squill and senega. It is then boiled to one-half, and strained; the sugar is added, and the whole evaporated to three pints. Whilst hot, the tartrate of antimony and potassa is dissolved in it. It may also be prepared by the process of displacement.) This preparation is commonly known under the name of *Hive Syrup;* and as a formula of the kind was originally proposed by Prof. J. R. Coxe, it bears the name of *Coxe's Hive Syrup.* It is much used in domestic practice, and is a favourite remedy in croup and every form of pulmonary catarrh in children. The dose is from ten drops to a fluidrachm, according to the age of the child, repeated every fifteen or twenty minutes until it operates. It is doubtful, however, as elsewhere remarked, whether this syrup have any virtues as an emetic not possessed by tartrate of antimony and potassa, or ipecacuanha.

5. LOBE'LIA.

Lobe'lia Infla'ta, *Indian Tobacco*, or *Emetic Weed;* Sex. Syst. Pentandria Monogynia: Nat. Order, Lobeliaceæ; is an indigenous plant, which is a common weed throughout the United States, beginning to flower about the end of July and terminating on the occurrence of frost. The plant is collected in August or September.

When chewed it produces the same effects as tobacco. Like it, too, it appears to contain an essential oil on which its odour depends, and an acrid and alkaline principle, to which its effects on the system have been considered to be ascribable. To this acrid principle, Mr. Proctor, of Philadelphia, who separated it, gave the name *Lobelina.* He found that the seeds contained at least twice as much in proportion as the whole plant, which yielded only one part in 500.

Lobelia imparts its virtues to the same menstrua as ipecacuanha. It is a powerful acro-narcotic, and has, therefore, to be administered with caution. On this account it is not often given, in regular practice, as an emetic. The dose of the powder is from five grains to twenty, repeated until it operates.

TINCTU'RA LOBE'LIÆ, TINCTURE OF LOBELIA. (*Lobel.* ℥iv; *Alcohol. dilut.* Oij; prepared either by maceration or by the process of displacement.) The full dose of the tincture, as an emetic, is about half a fluid ounce; but it is sometimes prescribed as an emetic and narcotic in asthmatic cases, in the dose of f. ʒj. or f. ʒij, until vomiting is induced.

6. SINA'PIS.—MUSTARD.

Mustard is the seed of *Sinapis nigra*, and *S. alba;* Sex. Syst. Tetradynamia siliquosa: Nat. Ord. Cruciferæ; plants which are indigenous in Europe; but cultivated there as well as in this country, and which flower in June. It is kept in the shops, both in seed, and in fine powder, as prepared, on the large scale, for culinary purposes.

Black mustard seeds are small and roundish; of a reddish or blackish-brown colour externally, and yellow internally. When entire, they are inodorous; but when bruised, the odour is very pungent; taste, bitterish and acrid. The seeds of white mustard are larger, and of a somewhat less pungent taste. Both varieties afford a yellow powder, of a somewhat unctuous appearance. When bruised or powdered, they communicate their active properties to water, but only slightly to alcohol.

Both black and white mustard seeds have been repeatedly subjected to chemical analysis, and the results are interesting to the organic chemist, but very little so to the therapeutist. When black mustard seed are subjected to pressure, about 28 per cent. of fixed oil is obtained, which has a faint smell of mustard, and a mild oily taste, and which has been used as a cathartic and anthelmintic. On distillation with water, a volatile oil is obtained, which is exceedingly acrid, and contains a portion of sulphur. This oil, it appears, does not pre-exist in the seeds, but is produced by the action of water.

White mustard seeds contain more fixed oil than the black, but they cannot be made to yield any volatile oil. Their activity appears to be owing to a non-volatile acrid substance, which does not exist ready formed in the seeds, but is readily formed in them under certain conditions. It was affirmed, many years ago, (*Troupeau* and *Blanc*,) that the irritating property of black mustard is diminished by the addition of vinegar, which is very often used in forming sinapisms; and that a mixture of concentrated acetic acid in certain proportions with black mustard powder is wholly inert, although either one or the other would act as a powerful excitant, if used—the former with water, and the latter undiluted. The vinegar and acetic acid, in these cases, have the effect of preventing the development of the acrid volatile oil. Some interesting experiments have been made on this subject, by two recent writers on therapeutics and materia medica. They found: *First*. That there was no notable difference between mustard pounded eight days before it was used, and that which had been pounded five months before. *Secondly*. That a sinapism prepared with hot water, acts more rapidly than one prepared with cold water; but at the end of a few minutes this difference no longer exists. *Thirdly*. That mustard mixed with water acts with greater energy than that which is mixed with common vinegar, weak acetic acid, and concentrated acetic acid; and that reciprocally, acetic acid, mixed with mustard, loses of its activity. (*Trousseau* and *Pidoux*.) These gentlemen add, that the admixture with vinegar appeared to have no effect on English mustard—a discrepancy which they express themselves unable to explain. It has been suggested, however, that this may perhaps be referable to the fact, that common English flour of mustard contains pod pepper, the active principle of which (*capsicin*) is soluble in vinegar, (*Pereira*.) It does not appear that the same deteriorating influences are exerted on white mustard.

The medical properties of mustard, are those of an acrid excitant. When it meets with water—as already remarked—volatile oil is developed, which is the occasion of the acrid vapour, that arises when flour of mustard and hot water are mixed together.

Mustard seeds bruised, or the powder in the dose of a large tea-spoonful, will generally operate as an emetic, and have been esteemed useful, where it has been considered advisable to rouse the sensibility of the stomach,—as when narcotic poisons have been taken, in malignant cholera, and in certain forms of paralysis. It is more frequently, however, diffused in warm water, and administered to aid the operation of other emetics.

7. TAB'ACUM.—TOBACCO.

The leaves of *Nicotia'na Tab'acum*—Sex. Syst. Pentandria Monogynia; Nat. Ord. Solaneæ or Solanaceæ—are the officinal portion of the plant, well known, owing to its extensive cultivation in this country, and to its employment in most parts of the globe. It imparts its properties to both water and alcohol; but long boiling destroys them, and, accordingly, the extract is devoid of all the virtues of the plant.

Tobacco has been subjected to analysis by many chemists; the result of which would seem to show, that the two main active principles are—a peculiar oily-like alkaloid, called *Nicoti'na*, or *Nico'tia;* and a camphoraceous volatile oil termed *Nico'tianin, Concrete volatile oil of tobacco,* and *Tobacco camphor.* Nicotia belongs to the same class of principles as conia, and closely resembles it in chemical properties. It appears to be the most active of the constituents.

When tobacco is distilled at a higher temperature than that of boiling water, an empyreumatic oil is formed, under new combinations, which is most virulently poisonous. This oil is formed in the pipe of the smoker, and is associated with nicotia.

In large doses, tobacco is one of the most violent acro-narcotic poisons. In smaller, it occasions vomiting accompanied by the most deadly sickness and sedation. Hence, its use in cases where great relaxation is necessary. Its powerful nauseant and emetic operation, as well as its effect on the nervous system, is well seen in those, who attempt to chew or to smoke it for the first time. Even when given in glyster, or applied to abraded surfaces, it has caused death; and a tobacco cataplasm applied to the pit of the stomach has succeeded in inducing nausea and vomiting; more especially where other emetics have been taken previously.

As a nauseant, and therefore relaxant, it has been employed in various forms of colic, constipation and strangulated hernia; and its operation is generally attended with nausea and giddiness. In these cases, it is thrown into the rectum either in the form of infusion, or of smoke; and in strangulated hernia especially, it has proved effective, after blood-letting, tartrate of antimony and potassa, and other sedative relaxants had been used in vain. In like manner it has been prescribed in retention of urine, tetanus and other spasmodic diseases,—wherever, in short, it is important to produce powerful sedation, or to relax spasm. Still the fatal results, occasionally supervening on its employment, must be borne in mind, and it must not be used except in cases, which have resisted other means. This, is probably the cause, why both the physician and the surgeon prescribe it rarely.

Tobacco has been given as an emetic, in the form of snuff,—five or six grains constituting a sufficient dose; but it is rarely prescribed in this shape.

INFU'SUM TAB'ACI, INFUSION OF TOBACCO.—(*Tabac.* ʒj; *Aquæ bullient.* Oj.) This is never used except as an enema to produce relaxation. It is safer to inject only one half; and if the relaxant effects be not induced in half an hour, to throw up the remainder. It must be borne in mind, that a smaller quantity than half a drachm has proved fatal.

VINUM TAB'ACI, WINE OF TOBACCO.—(*Tabac.* concis. ℥j; *Vini.* Oj.) This preparation has been more frequently employed as a diuretic, but it is capable, in repeated doses of thirty or forty drops, of inducing nausea. A cataplasm is sometimes made of common snuff and cerate, and has been applied to the throat and breast in cases of croup; and Dr. Wood states, that one of the worst cases of spasm of the rima glottidis which he had seen, and which had resisted powerful depletion by the lancet, yielded to the application of a tobacco cataplasm to the throat.

The infusion of tobacco has, likewise, been employed with advantage as a bath in tetanic and similar neuropathic affections, and also the cigar in the case of those who have been unaccustomed to its use.

8. SANGUINA'RIA.—BLOODROOT.

Sanguinaria is the root of *Sanguina'ria Canaden'sis, Bloodroot, Puccoon, Indian Paint, Tur'meric;* Sex. Syst. Polyandria Monogynia; Nat. Ord. Papaveraceæ; an herbaceous perennial plant, which flowers early in spring, and grows abundantly in every part of the United States.

The root, which is the only officinal portion, when dried, is in flattened pieces, much wrinkled and contorted. The fracture is spongy and uneven,—its surface being at first bright orange, but becoming, by exposure, of a dull brown colour. It has a bitterish acrid taste, and imparts its virtues to water and alcohol. An active principle—*Sanguinarine*—has been obtained from it, which is alkaline, and considered to possess all the virtues of the root. It is said to lose its virtues rapidly by keeping.

Bloodroot is an acrid emetic; and, in large doses, belongs to the class of acro-narcotic poisons. It is not often employed as an emetic. The dose of the powder, with this view, is from ten to twenty grains. It is recommended, that it should be taken in pill by preference, in consequence of the great irritation of the throat produced by the powder when swallowed. (*Wood* and *Bache.*) It may also be prescribed in infusion. (*Sanguinar.* ℥ss; *Aq. fervent.* Oj.) of which the dose may be a tablespoonful or two.

TINCTURA SANGUINARIÆ, TINCTURE OF BLOODROOT.—(*Sanguinar.* cont. ℥iv; *Alcohol. dilut.* Oij. Prepared by maceration or by the process of displacement.) The dose as an emetic is f. ʒiij. to f. ʒiv. but it is not often administered as such.

9. AN'THEMIS.—CHAMOMILE.

Chamomile is the flower of *An'themis no'bilis;* Sex. Syst. Syngenesia Polygamia Superflua; Nat. Ord. Compositæ Corymbiferæ, a plant which is indigenous almost everywhere in temperate Europe. The flowers become double by cultivation; and hence those which are found in the shops, and which are imported from Germany and England, are of this character. It is cultivated largely around London for the market of that city.

The odour of chamomile is powerful, fragrant and grateful, and the taste warm and bitter. It imparts its virtues to both water and alcohol, the former of which, at the boiling temperature, extracts nearly one-fourth of its weight. Its most important constituents are,—volatile oil, bitter extractive and tannic acid; and as the excitant properties are greatly dependent upon the first of these, decoction is an objectionable form, where it is desirable to have a preparation containing all the virtues of the drug.

With the view of producing emesis, but one preparation of chamomile is ever given,—the tepid infusion; and it is rarely prescribed except with the view of aiding the action of other emetics, or in cases where there is a disposition in the stomach to relieve itself spontaneously.

INFUSUM ANTHEMIDIS, INFUSION OF CHAMOMILE. (*Anthemid.* ℥ss; *Aquæ bullient.* Oj. Dose, as an emetic, f. ℥iv. The infusion—*Chamomile tea*—is generally, however, made extemporaneously in domestic practice.

10. HYDRAR'GYRI SULPHAS FLAVUS.—YELLOW SULPHATE OF MERCURY.

This salt of Mercury, called also *Subsulphate of Mercury* and *Turpeth Mineral,* is obtained by throwing a sulphate of mercury into boiling water. It is a lemon-yellow powder, almost insoluble in water; dissolving in about 2000 parts of cold water, and in about 600 parts of boiling water.

Yellow sulphate of mercury is in large doses a violent corrosive poison. It is occasionally, but rarely, given as an emetic; its operation being very severe, and at times followed by ptyalism. Exciting great nausea and powerful retching, it would be much employed in cases in which a strong revulsion is indicated, were it not that its action is so harsh, and unmanageable.

The dose as an emetic is from two to five grains.

11. SO'DII CHLO'RIDUM—CHLORIDE OF SO'DIUM.

When common salt—whose properties are described under the head of Cathartics—is taken in the dose of a tablespoonful or more, it excites vomiting; and during the visitations of epidemic cholera, it was preferred by some practitioners to other emetics. It has also been given in cases of narcotic poisoning, where neither the stomach-pump nor other emetics were at hand.

A few other indigenous substances that act as emetics have been admitted into the secondary list of the Pharmacopœia of the United States, viz:

12. Apocy'num androsæmifo'lium, *Dog's bane;* Sex. Syst. Pentandria Digynia; Nat. Ord. Apocynaceæ; a plant which flourishes in every part of the Union, flowering in June and July, and is emetic in the dose of thirty grains of the dried root.

13. Ascle'pias Incarna'ta, *Flesh coloured Asclepias;* Sex. Syst. Pentandria Digynia; Nat. Ord. Asclepiadaceæ; flowering from June to August. The root has been used as an emetic and cathartic.

14. Erythro'nium, *Dog's Tooth Violet;* Sex. Syst. Hexandria Monogynia; Nat. Ord. Liliaceæ; which grows throughout the northern and middle States; flowering in April and May; the root and herb being officinal. Dose, as an emetic, twenty or thirty grains of the recent bulb.

15. Euphor'bia Corolla'ta, *Blooming* or *Large flowering Spurge, Milk weed;* Sex. Syst. Dodecandria Trigynia; Nat. Ord. Euphorbiaceæ; which grows in various parts of the United States, flowering in July and August; and the dried root of which is emetic in the dose of from ten to twenty grains.

16. Euphor'bia Ipecacuan'ha, *Ipecacuanha Spurge, American Ipecacuanha,* which flourishes in the middle and southern states, blooming from May to August; and the dried root of which is emetic in the dose of from ten to fifteen grains.

17. Phytolac'cæ Radix, *Poke root*—the root of *Phytolac'ca Decan'dra;* Sex. Syst. Decandria Decagynia; Nat. Ord. Phytolaceæ; which is emetic in the dose of from ten to thirty grains; but is slow and long protracted in its operation, apt to act upon the bowels, and in very large doses to induce symptoms of acronarcosis. It is therefore not often used.

II. CATHARTICS.

Synon. *Dejectoria, Eccathartica, Hypactica, Lapactica, Apocathartica, Coprocritica.*

Definition of cathartics—Effects they are capable of inducing—Organs on which they act—Divided into laxatives and purgatives—Drastics—Abuse of cathartics—Glysters—Suppositories—Therapeutical application—In fevers—In inflammatory disorders—In hemorrhage—In the neuroses—In dropsies, &c. Special cathartics.

The simplest definition of cathartics is—'agents that increase the number of alvine evacuations.' Certain writers on Therapeutics have endeavoured to incorporate in the definition their *modus operandi;* and, in a modern work, the definition is still farther, and with less propriety, extended,—so as to include other effects which they may or may not induce. Thus, the Messrs. Schroff, (*Taschenbuch der Arzneimittellehre,* u. s. w. s. 63,) define them to be;—"Medicines, which, by augmenting the secretion and peristole of the intestinal tube, occasion the evacuation by the anus of accumulated and noxious matters:" but it is obviously not necessary for the induction of catharsis, that there should be any accumulation—physiological, pathological, or noxious—in the bowels. The definition is, consequently, faulty.

There is no class of medicinal agents possessed of more valuable properties, and none more abused. Exposed, as the digestive organs are, to the most heterogeneous and often irritating substances, and liable to have their tone injured by alternations of stimulation, and the opposite condition, accumulations of food as well as of secretions are apt to occur, which demand the use of cathartics; their effect, too, is not confined to the mucous membrane of the alimentary tube: through the nerves, it is propagated elsewhere, so as to react on organs, situate at a distance from the seat of the impression.

To fully comprehend the effects which cathartics are capable of inducing, it may be well to consider briefly the organs and tissues on which their operation is immediately exerted.

The mucous coat of the small and large intestines is an extension of that of the stomach, and, with some modification, of that of the supra-diaphragmatic portion of the digestive tube; and this, again, may be looked upon as an extension of the cutaneous envelope of the body. Like the mucous lining of the stomach, that of the small intestines is a part of the surface of relation, and impressions, made upon it, are probably conveyed, with equal facility, to the great nervous centres—cerebro-spinal or ganglionic. Hence, it is, that it has been regarded as the seat of many important diseases, of a febrile character especially. (*Broussais.*)

In the mucous coat are situate many of those mucous follicles, which, in consequence of their having been described by Brunner, Peyer, and Lieberkühn, have been called after those observers. Their function is to secrete mucus for lubricating the mucous membrane; but, of late, their importance in the economy has been exaggerated by some; and, as has been previously remarked, they have been looked upon as the seat of many of those ataxic and adynamic fevers, which Broussais refers to the mucous membrane generally. It does not appear probable, that these small follicles can be so intimately associated, in their morbid derangements, with the great vital organs, as to give occasion to the diseases, that have been ascribed to them. Their function seems to be similar to that of the sebaceous follicles of the cutaneous envelope, and they have not perhaps any great agency in the causation of disease. Frequently, on dissection they are found considerably enlarged, and this is, doubtless often owing to their forming part of the lining of the tube, as Broussais has suggested. At other times, they are enlarged and ulcerated, and thus become one of the expressions of typhoid fever, but not the essence of it; as the eruption of measles or scarlatina is only one of the expressions or manifestations of those diseases.

The mucous membrane, besides the secretion from the follicles, exhales the ordinary halitus of the mucous membranes, and the two together are to a considerable amount. The daily quantity, indeed, of the *liquor entericus* or *succus intestinalis*, as it has been called, was estimated by Haller at probably far beyond the truth.

In addition to this humour, the upper part of the small intestine receives the secretions from two important organs,—which, from their presumed agency in chylosis, have been termed *assistant chylopoietic viscera*,—the liver, and the pancreas, whose ducts open together.

From the upper portion of the small intestine more especially, the chyliferous vessels arise:—this part of the tube must therefore be regarded as the great seat of chylosis or chylification.

It is not until the fæces have attained the lower part of the small intestine, or the commencement of the large, that they attain the full fæcal odour. This is not produced altogether by the reaction of the elements of the food upon each other, but by a peculiar secretion; so that alvine discharges, possessed of the full fæcal odour, may take place, even when little or no food has been taken; and, in the course of febrile affections, it becomes important to remove those, should constipation arise, as they are capable of inducing as much irritation as if they were the product of the digestion of alimentary matter. So long as life persists, secretions are poured into the alimentary tube throughout its' whole extent, from the lining membrane, as well as from the liver and pancreas; and if these are permitted to remain in the canal, they become the *foyers* of irritation, and mischief. The argument, often urged,—that it is not necessary, that the bowels should be kept open, in morbid cases, because no food has been taken,—is, therefore, erroneous.

Although in the upper portion of the small intestines an arrangement of the mucous coat exists, calculated to detain somewhat the aliment in its course downwards, and to extend the surface for the origin of chyliferous vessels; in no part of its extent does it present the character of a reservoir. The opposite to this is the case with the large intestine. Its saccated arrangement clearly shows it to be destined for the detention of the fæcal matters, until they have accumulated to such an extent as to give rise to the necessity for the action of defecation. In these saccated portions, the fæces are occasionally retarded, become indurated, and adhere to the mucous membrane, so as to excite irritation: and, when evacuated, they are in the form of small rounded masses, to which the name *scybala* has been given.

The whole of the intestinal canal is more or less endowed with the vermicular, oscillatory motion, which has been called *peristole*, or *peristaltic action*. This motion is under the influence of the ganglionic nerves, through which the muscular coat of the tube is excited to contraction, and the degree in which contraction occurs is greatly connected with the mode in which the function of digestion is accomplished.

Lastly, it is important to keep in view, that various organs are contiguous to the alimentary tube, whose functions are susceptible of modification by agents that affect it. Reference has already been made to the liver, and pancreas; and it will be found, that the uterus can, in this way, be considerably modified in its actions. (See the author's *Human Physiology*, 4th edit. 1. 467; Phil. 1841: and *Practice of Medicine*, i. 24, Philad. 1842.)

As regards the effects of cathartics on the intestinal canal, much difference exists according to the nature of the agent, and the dose in which it is exhibited.

When the lining membrane is but slightly stimulated, chylosis may be augmented, and a laxative tendency be induced; if it be more stimulated, the exhalation from it may be increased, and the irritation be extended by the sympathy of contiguity to the muscular coat, so that there may be a slight increase in the peristole; and if the specific stimulation be yet greater, both the exhalation and the peristole may be largely augmented.

The effect of a mild cathartic may be almost wholly restricted to the evacuation of the tube, and but little effect be exerted on other organs, or on the general system. The first evacuations, which result from its operation, consist merely of the contents of the intestines: those that follow are mixed with the secretions of the canal, and of the liver and pancreas, with the drinks that have been taken; and at times, fluids—as soups—may be readily detected in the discharges. Yet, as the appearance of an unusual quantity of bile, in the matters ejected by vomiting, may merely be an evidence, that the excitement accompanying emesis has caused a greater secretion of bile, so—it must be borne in mind—the alvine discharges may assume an unhealthy bilious character, under the operation of a cathartic, owing solely to the irritation it induces in the various secretory organs of the digestive apparatus. When the mild chloride of mercury, for example, is administered as a cathartic, it irritates the lining membrane of the duodenum, and this irritation extends along the biliary ducts to the liver, the secretion from which is augmented. At the same time, it irritates the different follicles of the canal, and the exhalents generally, so that evacuations are occasionally induced by it, which resemble chopped spinach, and which are regarded by some, as indicating, that it has succeeded in inducing a new action in the mucous lining of the digestive tube. It can, hence, be understood, that after the operation of calomel, or of any purgative, whose action is chiefly exerted on the upper portion of the intestines, there may be a greater quantity of bile in the evacuations, without our being justified in inferring, that the individual is *bilious;* and, that the increased flow of bile is occasioned by the purgative may be proved by discontinuing its use for some days, when the signs of bile in the evacuations will cease, and be reproduced, when it is resumed.

It has been mentioned, that the mild chloride of mercury affects the upper part of the intestinal canal; and the same may be said of rhubarb, colocynth, &c. There is, indeed, a singular preference on the part of different cathartics for different portions of the tube; some,—as the articles enumerated,—acting on the upper part; others,—as aloes,—on the large intestines, and especially on the colon and rectum; and others,—as the saline and oily,—affecting the whole tract of the intestines. Accordingly, a selection may be made so as to suit the particular view of the practitioner. At times, too, it is desirable to act on other organs through the intestinal canal, by means of sympathy; as when we wish to affect the liver or pancreas,—in which case cathartics are chosen, that act upon the part of the tube into which their ducts enter,—or the uterus, when one is selected that acts by preference on the lower portion of the tube, and affects the uterus by sympathy of contiguity. It is in this way, indeed, that aloes has acquired its reputation as an emmenagogue.

Cathartics act not only on the bowels but on parts at a distance. Every portion of the organism is capable of being impressed by them. They are amongst the most generally useful, and applicable revellents, that we possess; and, when given to such an extent as to cause hypercatharsis, they rapidly reduce the powers of the system,—less, perhaps, by the copious exhalation of the serous portions of the blood, which they cause from the lining membrane of the intestines, than by the sympathy that exists between them and the vital organs. Reference has been made more than once to the destructive influence exerted on those organs by irritation—often unmarked by prominent symptoms—in the intestinal tube. It is by their mixed depletive and revulsive action that they become useful sorbefacients in hydropic affections, and cases of rapid disappearance of dropsical effusions under their operation are often witnessed.

Cathartics differ greatly from each other in their mode of operating. Some gripe much; others not at all. Some operate many times; others, rarely more than once; although much, in this respect, depends upon the individual. Pharmacologists have generally divided them,—according to the intensity of their operation,—into *laxatives*, *purgatives*, and *drastics*, under which all the articles may be arranged. To these may be appended another division—that of *enemata.* The ancient humorists, who considered, that most diseases were produced by the predominance of some particular humour, which needed evacuation, and that particular cathartics were eminently endowed with the power of fulfilling these objects, divided them into *hydragogues, phlegmagogues, cholagogues*, and *pantagogues* or *panchymagogues*, according as their operation was exerted more especially upon the watery portions of the blood, on phlegm, bile, or on the whole of the secretions from the tube collectively.

The division of cathartics into laxatives, and purgatives, is convenient, and not inappropriate. *Laxatives* gently stimulate the mucous coat of the intestines, and augment the peristole but little: hence, they are well adapted for cases, in which the sole indication is to unload the bowels of their contents. Some of them produce their effects entirely in a mechanical manner. Corn bread, for example, proves laxative, in consequence of the mechanical attrition of the particles of husk left mixed with it on the mucous membrane. In the same manner, bread, made of unbolted flour, is laxative, and becomes proper, in the way of diet, when there is torpor of the digestive function; hence it has attained the name *'dyspeptic bread.'* Other laxatives, again, are special local stimulants, or affect the mucous membrane by their medicinal properties,—as sulphur, magnesia, &c. These, when given in a much larger dose than usual, may still be but laxative. They do not induce full catharsis; and are, therefore, separable, with propriety, from the division of purgatives, many of which cannot, in the most minute dose, be made to act as laxatives.

Purgatives produce their effects like laxatives, but their operation is more powerful. They excite a copious exhalation from the mucous lining of the intestines, and augment the peristaltic action to a greater degree. It is in consequence of the evacuation of watery matters, produced by the operation of purgatives, that they are used as depletives in febrile, and inflammatory affections; and, from the excitation they occasion in the abdominal nerves, they are energetic revellents. This excitation is often shown in the tormina and irritation, that precede and accompany their operation.

The more violent purgatives have been termed *drastics*. They produce a greater degree of irritation in the lining membrane of the intestines, and occasionally act upon the nerves of the stomach so as to induce nausea, and even vomiting. They belong generally to the resinous or resino-extractive substances, and one reason, why they excite such violent tormina, appears to be, that they are sparingly soluble, and adhere to the mucous coat, from which they are tardily detached. This view is corroborated by the circumstance, that if we add any substance to them, which aids their solubility, the griping may generally be prevented, or considerably mitigated.

After all, however, the division of cathartics into laxatives and purgatives, although generally convenient, and not inappropriate, is not always so. Much depends upon the individual, so that a laxative may purge drastically; whilst a drastic may scarcely purge at all. Still, these are exceptions.

Cathartics usually produce their full effect without being absorbed; they are altogether local stimulants to the mucous membrane of the intestines, and, through it, to the muscular coat. Yet, they can act by the way of the circulation, and the fact is another instance of the singular preference, exerted by medicinal agents for certain parts of the organism, rather than for others. When a respectable physician (*Dr. Hale*, of Boston) injected castor oil into his veins, he speedily felt an oily taste in his mouth, which continued for a length of time, and the medicine acted powerfully as a cathartic. Croton oil, when placed on the tongue of an apoplectic, in whom deglutition is impracticable, produces its ordinary cathartic operation. Rhubarb exerts the same agency when applied to the skin; and the milk of a wet-nurse, who has taken infusion of senna, rhubarb or other cathartics, may act upon the intestinal canal of the child.

As a general rule, the action of cathartics is in a direct ratio with the dose within certain limits. Some, however, are so potent, that it is almost impracticable to reduce them to the point at which they are simple laxatives. Elaterium is one of these. On the other hand, there are agents, whose operation is altogether so gentle, that, if given to any amount, they will not be drastics. Such is the case with manna, magnesia, sugar, and olive oil. Their operation is always that of gentle cathartics or laxatives. There are substances, again, of this class, whose operation in a full dose, is more violent than that which is considered to characterize the action of laxatives, and which, when given in a much larger quantity, exert no more energy. Such is the general fact with calomel, castor oil, and rhubarb. The effect of these cathartics is commonly, indeed, but little understood, or, if understood, but little attended to. A tea-spoonful or two of castor oil is often sufficient to evacuate the bowels, not only in health, but in chronic febrile and other irritations,—where the object is simply to produce such evacuation. Exceptions, indeed, occur to this, but the rule is not the less general; and it is important to bear it in mind, inasmuch as the stomach is often extremely irritable, and but little adapted, in those affections, for the reception of a considerable quantity of indigestible oleaginous matter. When given in these small doses, it is one of the best cathartics we possess for keeping the alimentary canal clear, when there is irritation of the gastro-enteric mucous membrane, as in gastric and other fevers. It has been maintained, indeed, by Rasori and others, that the action of all cathartics increases in a direct ratio with the dose within certain limits only, and that beyond these, the opposite is the fact,—the evacuant power being, in other words, directly as the dose up to a certain point, and inversely as the dose beyond that point; that in the latter case they may act as sedatives without producing any cathartic effect whatever; and that, consequently, most purgative medicines may be considered not only as simple evacuants, but as antiphlogistics or sedatives. (*Spillan.*) To this subject, however, reference will have to be made under the individual articles of the class, and especially under Calomel, where the difference of action according to the dose is more strongly marked perhaps than in the case of any other cathartic.

Substances, when largely divided, so that fresh and fresh portions come into contact with the lining membrane of the digestive tube, generally act with more efficiency, than when they are given in such form, that the cathartic touches in bulk the surface on which it has to operate. Thus, an ounce of the sulphate of magnesia, dissolved in half a pint of water, and taken by teaspoonfuls, at short intervals, will induce a greater action than if the whole solution were swallowed at once. This fact is elucidated by a case, which the late Dr. James Gregory, of Edinburgh, was in the habit of relating in his lectures. A boy was directed to take an ounce of Epsom salts, but, having a strong objection to the taste of the cathartic, he resolved to form it into pills with crumb of bread. On making the pills of an appropriate size, he found they amounted to three hundred and sixty, a number corresponding so nearly with that of the days of the year, that he determined to make it correspond entirely. Accordingly, he divided them into three hundred and sixty-five portions, and took them one after the other. The effect was extraordinary. The most violent hypercatharsis was induced so as to endanger his life. This was owing probably to the gradual and successive breaking down of the pills in the stomach, so that particle after particle came in contact with the mucous membrane, and exerted its specific effect.

We can thus understand, that a saline cathartic, dissolved in a large quantity of water, may act more powerfully than if the quantity of the solvent were less. In many of the saline mineral waters, which are employed as cathartics, the quantity of saline ingredients is extremely small. A pint of the Seltzer water is found to contain but five grains of carbonate of magnesia and seventeen of chloride of sodium. The same measure of Spa water contains nine and a half grains of carbonate of magnesia, and one quarter of a grain of chloride of sodium. The Aix-la-Chapelle water has five grains of chloride of sodium to the pint; the Balston, five grains of carbonate of magnesia, and eighteen of chloride of sodium; the Bedford, one and a half grain of chloride of sodium, and ten grains of sulphate of magnesia; and the congress spring, at Saratoga, twelve grains of the carbonate of magnesia, and forty-eight grains of chloride of sodium.

Many of the resinous purgatives excite much griping during their operation,—apparently—as observed above—by adhering to the mucous lining, and acting as violent irritants; hence *corrigents* are required to remove the disagreeable accompaniments of their ordinary operation. These may consist,—either of substances, which add to their solubility;—of agents, which, by augmenting the peristole of the canal, hurry on the cathartic, so that it does not remain, for any length of time, in contact with any one portion of the mucous membrane;—or of such as shield the intestinal canal against its irritating influence.

As a general rule, the soluble cathartics act more speedily than the others; yet, the cathartic oils are exceptions to this, for they are scarcely, if at all, soluble,—undergoing little or no change in the stomach. Castor oil becomes mixed with the various secretions and substances in the alimentary canal, and is divided into small filaments, so as occasionally to deceive the practitioner. Some years ago, J. P. Frank was requested to see a prince, who had been attacked with epilepsy. His physician, a respectable old practitioner, assured Frank, that he could at pleasure make his patient void thousands of filiform worms. As he was neither able to define the genus, nor species of these worms, the quantity of which, from his account, was prodigious, Frank requested to be a witness of the phenomenon. The physician administered a dose of castor oil, which produced several evacuations, in which were thousands of whitish filaments resembling small eels; but, on an attentive examination, these supposed worms were found to consist entirely of castor oil, divided in the manner above mentioned.

Owing to the fact, that—as a general rule—soluble cathartics act sooner than those that are less so, we can understand, that mixtures may operate more speedily than pills; that saline cathartics may act more freely if we allow liquids to be taken during their operation, and that the resinous cathartics may be longer in operating than the saline. It has been attempted—but not with complete success—to show, that difference of solubility may account for certain purgatives acting more upon one part of the intestinal canal than upon another.

When demulcents are given along with acrid purgatives, they moderate the violence of their action, by shielding the mucous surface, so as to diminish the amount of local stimulation. In the same way, narcotics lessen the impressibility of the nervous system, and thereby diminish the operation of cathartics, but if much spasm exist in the intestinal canal, they may aid the operation. Suppose, for example, a state of constipation, accompanied with violent colic, but without enteric inflammation; the combination of a full dose of an opiate with a cathartic will allay the spasm, and induce catharsis. Indeed, where enteric inflammation actually exists—especially if copious blood-letting have been premised—such a union of sedative and cathartic is often succeeded by the most beneficial results. The different varieties of colic, by many intelligent practitioners, are treated almost wholly by a combination of calomel and opium.

If the desire be simply to evacuate the bowels, without heeding the revulsive effect, which cathartics are capable of inducing, the rapid purgatives and forms of administration are to be chosen; —such as castor oil, and the various saline substances; but, where habitual constipation exists, it is not always advisable to administer these agents, in such doses as to act violently. A cathartic removes the contents of the canal, but it does not obviate the pathological condition, which gives rise to the constipation. On the contrary, in accordance with the laws of compensation, which prevail so extensively in the animal economy, it is found, that the tendency to constipation is augmented after its operation,—diminished action of the exhalents of the mucous membrane, and of the muscular coat succeeding to the exaltation of the vital manifestations, produced by the operation of the cathartic; hence, if active cathartics be had recourse to, in habits disposed to constipation, whenever this state exists, the person, in time, demands so imperiously the stimulation they excite, that he is unable to have an evacuation without them. This result is more liable to supervene after the action of certain purgatives than of others. Castor oil, and croton oil are more exempt from it than other cathartics, whilst rhubarb is generally esteemed more obnoxious to the remark than any of the class.

The best mode of obviating this tendency to constipation is, to avoid the exhibition of cathartics, that powerfully excite the organs directly and indirectly concerned in defecation, and to trust altogether to the employment of laxatives, and an appropriate regimen. The best laxatives, for such purpose, are those that affect the whole extent of the canal, and possess the property of developing its impressibility. Such, it has been seen, is the operation of saline cathartics. A good preparation of this kind is a mixture, formed by pouring a quart of boiling water on an ounce of sulphate of magnesia, and one drachm of bitartrate of potassa, and directing the patient to take a wine-glassful of the solution every night and morning, until the bowels are made to respond properly. The bitartrate of potassa is laxative, and its acid character masks the disagreeable taste of the sulphate of magnesia: the combination rarely fails to restore the intestinal functions to their due condition; but it is occasionally necessary to persevere in the use of the remedy for some weeks before the full beneficial results are obtained. The author had a marked case of the good effects of this agent on a gentleman, who was unable to have an evacuation without the use of rhubarb, of which he was compelled to chew a considerable quantity daily. The habit was broken in upon, and the bowels restored to their proper action, by the use of the saline solution, but no decided benefit was derived, until it had been persevered in for some time.

It is easy to conceive, that cathartics, which simply evacuate the contents of the bowels, may be more demanded in warm climates and seasons than in cold, in consequence of the erethism of the mucous membrane of the alimentary tube, which is developed during great atmospheric heat; yet, owing to this very erethism, as well as to the greater degree of sensibility of the nervous system, generally induced by the same atmospheric condition, drastic cathartics may have to be used with more caution.

The abuse of purgatives, like that of emetics, occasions great exaltation of the sensibility of the digestive tube. Broussais observes, in the commentary to his 155th proposition, that he had frequent opportunities for witnessing this effect in persons, who had taken the purgative of Le Roy, in the manner directed by that empiric,—that is, for several days in succession. So much irritability of the digestive apparatus was caused, that it was impossible to restore the equilibrium of action. "In them, digestion, defecation, and even the simple passage of matters into the small intestine are painful; many very uneasy and singular sensations accompany the slightest efforts of the muscles of the stomach and intestines, and are felt not only in the abdomen, but in every part in which the cerebral nerves predominate. A most unpleasant buzzing in the ears is the first consequence of these imprudent medications; to this, various pains in the head are soon added, with weight and fulness of the eyelids; tenderness of the limbs, joints, and periosteum, and of a portion of the skin, with often an inexpressible uneasiness, the seat of which cannot be assigned to any particular part. Almost every kind of motion becomes painful at certain periods of digestion; but as these pains are not always referred to the exact portion of the stomach or bowels with which the food is in contact, as most commonly the ingestion of food is followed by a feeling of health, which causes a momentary oblivion of all suffering, the patients accustom themselves to associate the idea of improvement with that of agreeable food or drink, and make the sum of their evils an entity (disease) for which tonics are the true remedies."

Although it may happen, that all these signs of mischief are occasionally produced by the abuse of cathartics, they rarely perhaps present themselves, in conjunction, in the same individual. At the present day, indeed, such abuse is by no means as common as it was half a century ago; the impropriety of keeping up perpetual irritation in the lining membrane of the intestines, in diseases, often themselves arising from irritation in this very membrane, having become appreciated. It need hardly be added, that whenever such irritation or active inflammation is shown to exist, the operation of drastic cathartics, or of ordinary purgatives, is contra-indicated, although it may still be important to preserve the tube free from morbid secretions—which cannot fail to be thrown out in such a state of the membrane—as well as from extraneous matters taken as aliment, which, under febrile heat, might be likely to undergo morbific changes. The bad effects, resulting from the administration of active cathartics, in cases of fever, of the adynamic kind especially, are yet too frequently witnessed.

During gestation, as well as during menstruation, violent cathartics must be prescribed with caution; and those, whose action is exerted by preference on the lower part of the intestinal canal, should—as a general rule—be avoided. For this reason, purgatives of the aloetic kind are not given, unless their operation is tempered by the addition of some substance, as soap, which, by adding to their solubility, diffuses their action over a larger surface of the alimentary canal; or, by the addition of a narcotic, as hyoscyamus, which renders their operation less irritating. Many of the abortives, employed with a criminal intent, belong to the class of cathartics,—their primary operation being exerted on the intestinal canal, and the uterus becoming affected by contiguous sympathy.

A selection of cathartics may be made, to a certain extent, to suit the age of the individual. In very young infants, the milder cathartics are employed,—as castor oil; magnesia; or rhubarb, —combined, or not, with magnesia. Generally, during early childhood, there is a great predominance of acidity, so that absorbent laxatives are especially indicated; hence it is, that magnesia is in such common use. Calomel is also much given during the first periods of life, owing to the facility with which it can be administered. In old age, the warmer resinous cathartics are usually employed, and these are generally given in the form of pill.

In referring to the influence of the *moral* over the *physique*, it was remarked, that, under particular emotions, some of the excretory functions are acted upon, and, amongst these, those concerned in defecation. Anxious dread, or excessive fear has this effect in a marked manner; and it has been probably experienced by every one under such circumstances. Certain emotions may, therefore, be looked upon as *mental cathartics*, although, as such, not capable of being employed in the treatment of disease.

In the administration of cathartics, some choice as to time can occasionally be indulged. For example, if the pilular form be chosen, and substances difficult of solution be selected, they may be taken at bed-time. Accordingly, pills of the mild chloride of mercury—to be followed the next morning by a saline or other soluble cathartic—are directed to be taken at the time of retiring to rest. On the other hand, saline aperients, castor oil, &c., are generally given in the morning, their operation being more speedy, and therefore more likely to disturb the patient, if administered at night. Very early in the morning, when the stomach is entirely empty, a small dose of a cathartic often operates as speedily, and effectually, as a much larger taken after breakfast. Of course, when the administration of cathartics is imperiously demanded, no opportunity is left for choice of time.

During the action of cathartics, the dermoid system is extremely impressible; and if the patient be exposed to the partial and irregular application of cold, derangement of capillary action is apt to be induced, and if there be any tissue or organ, particularly liable at the time to take on diseased action, it will be apt to do so.

ENEMATA.

Cathartics may, likewise, be exhibited to act on the lower part of the intestinal tube by direct application. In this form, they are termed cathartic *glysters*, *enemata*, or *lavemens*. When thrown in contact with the lining membrane of the rectum they irritate it; and, by sympathy of continuity, their influence is extended to the upper portion of the tube. Hence, they may be administered with advantage, when cathartics cannot be easily given by the mouth, as where deglutition is impracticable. Accordingly, in apoplexy, trismus, &c., this is a mode of exhibiting purgative and other remedies often had recourse to. It is obvious, too, that glysters may be given with advantage to aid the operation of cathartics; and, in cases of extreme debility, in which apprehension is entertained, that cathartics, administered in the ordinary mode, may act too powerfully, glysters can be advantageously substituted. They are most valuable agents, and, until of late, have been too little employed in this country, as well as in Great Britain; but, on the continent of Europe, they form a part of the *boudoir* of every female, and are regarded indispensable to cleanliness and to health. In the *Malade Imaginaire* of Molière, Argan enters on the stage, reading his apothecary's bill,—in which the clyster and its adaptation occur over and over again,—without any feeling of outraged delicacy on the part of the auditors; whilst with us the slightest allusion to the operation or the instrument cannot be mentioned to ears polite.

Even cold water, thrown into the rectum, excites the peristole of the intestines, and produces a salutary effect in inflammation of the lining membrane;—the cooling influence being propagated upwards, by virtue of the extensive sympathy that exists between every part of the capillary surface. In the same manner, warmth can be applied so as not only to act as a fomentation to the parts with which the material of the glyster comes in contact, but to have the soothing effect extended to parts above; and, by means of contiguous sympathy, to organs seated in the vicinity of the lower portions of the tube. With both these views enemata are administered, but they are chiefly used for the purpose of stimulating the canal, so as to occasion the evacuation of its contents. For this purpose, warm water, soap and water, salt and water, molasses and water, or gruel with the addition of salt or castor oil, are generally the selected vehicles; and if the desire be to excite considerable revulsion in the rectum, oil of turpentine may be added, either formed into an emulsion with the yolk of egg, or simply mixed with the gruel or other constituents of the enema. At times, where the idea exists, that constipation is the effect of spasm in some part of the canal, the tobacco glyster is administered. This may be given either in the way of infusion or of smoke, which latter may be thrown up through an ordinary tobacco-pipe;—the tobacco being placed in the bulb. It is then ignited, and the bulb being put into the mouth, the smoke can be readily forced into the intestinal canal, by blowing through the tube. The exhibition of tobacco, in either mode, is attended, however, with danger, and therefore it ought only to be had recourse to with great caution. Cases, as elsewhere remarked, are on record of fatal results from an infusion of the strength directed in the pharmacopœias.

When glysters are administered by the ordinary bag and pipe, they rarely go farther than the rectum, and may therefore fail altogether in their operation. The syringe, employed of recent date, is capable of propelling the enema farther; but, at times, it also fails, especially where there is any obstruction at the termination of the sigmoid flexure of the colon, as is not unfrequently the case. Dr. O'Beirne has very properly directed attention to this point in the pathology of defecation, and has advised, that an elastic gum tube, like the ordinary stomach tube, should be gently insinuated through the narrow portion at the sigmoid flexure, until it has entered the colon; in this way, liquid fæces or flatus are occasionally brought away after every ordinary remedy has failed; and by attaching the external extremity of the tube to the stomach pump, an enema may be projected into the colon, and prove effectual, when the ordinary enemata, as usually exhibited, may have been administered in vain. (See the author's *Human Physiology*, 4th edit. i. 565, Philad. 1841: and *Practice of Medicine*, i. 180, Philad. 1842.)

Some years before the appearance of Dr. O'Beirne's observations, the author had an interesting case of obstruction of the bowels, in an aged individual, who, for almost the whole period of his existence, had held an honourable situation in his country's service. In this case, the colon appeared to be much distended by flatus. Injection after injection was thrown up by the only means at hand—the bag and pipe—but no relief was obtained. The symptoms became more and more urgent. Under these circumstances, the idea occurred, that if a hollow instrument could be passed up until it reached the part of the colon above the seat of the constriction, relief might be obtained. Accordingly, a large sized elastic-gum male catheter was passed, with some difficulty, through the sigmoid flexure, and as soon as its extremity attained the gut, a considerable discharge of fetid gas took place, and relief was instantaneous. This agency would probably be completely successful in affording relief, in those cases in which it has been recently advised to force air into the intestines for the removal of colic occasioned by the presence of air in the intestines;—a plan of treatment, by the way, which is minutely described by Swift, and the invention assigned to a medical philosopher of the Academy of Lagado!

The quantity of fluid, to be administered in the way of enema, must vary according to age, and other circumstances. For an infant, a few ounces may be sufficient; for an adult, from a pint to a quart; but if the desire be to wash out the colon, a considerable quantity may be necessary. In all cases, when given to produce a cathartic operation, the fluid ought not to be sent in too rapidly, as it is apt to excite the rectum to action, so as to occasion its immediate return, bringing along with it only the contents of that gut. The enema ought to stay long enough to excite, by sympathy, the whole tract of the large intestines at least; and, therefore, if it comes away in a few minutes—and especially if the discharge have but little fæcal matter mixed with it—it ought to be repeated.

SUPPOSITORIES.

It has been already remarked, that glysters are excellent revellents, when composed of materials possessed of excitant properties. The same may be said of *suppositories*, which are special excitants, or ordinary excitants, according to the ingredients of which they are composed. In early infancy, they are often employed to open the bowels, and are usually composed of turpentine soap,—a small conical piece, moistened, being forced up into the rectum, and left there, when it generally produces a free evacuation of the lower part of the canal. At times, the soap is smeared over with castor oil; at others, with turpentine, to add to the cathartic effect. In this way, as well as by glyster, any medicinal agent may be brought to affect the rectum; and accordingly, cathartics, opiates, &c., are often so administered.

It has been proposed to introduce a kind of galvanic suppository, made of two metals—zinc and copper—into the rectum, for the removal of constipation, and this has been attended, in some cases, with good effects; not, probably, in consequence of any specific excitation of the nerves of the rectum, by galvanism, but by its acting as an ordinary excitant to the nerves of the mucous membrane.

Another mode of employing the galvanic excitation is by forming a connection between two different metals; one being introduced into the mouth; the other into the rectum; but this apparatus is not possessed of more energy than the first, and both are perhaps largely indebted for their action to the local excitation, which their presence in the rectum engenders. The public and even the profession have been amused by various instruments, invented for the application of galvanism to different parts of the body; and if their efficacy on the frame have not been well marked, they have not failed to minister to the pockets of their inventors.

Dr. A. T. Thomson remarks, that the peristaltic action of the intestines may be increased by various external means; and, of these, he instances the electrical aura as highly useful in 'simple torpor of the gut;' and the dashing of cold water on the lower extremities, which has succeeded in procuring the immediate evacuation of the intestines "in obstinate costiveness, particularly in the case of ileus, when all other means have failed." Both these agents produce their effect less as special excitants, than by modifying the nervous distribution. We have already seen, that there are many nervous modifications,—those through the influence of the mind especially,—which act upon the intestinal canal, so as to produce catharsis.

Therapeutical Application of Cathartics.

The therapeutical application of cathartics will now be intelligible. They may, of course, be employed with various objects:—either to act as simple evacuants, as depleting agents, or as revellents.

In Fever.—In the disordered action of functions, constituting general fever—whatever may be its variety—their use is, throughout the disease, more or less indicated. In the state of erethism that exists in every portion of the dermoid structure, morbid secretions are necessarily formed, which, if not removed, act as fomites and induce irritation: yet although cathartics of a mild kind are needed to keep the intestinal canal free, it is—as has been before observed—a great mistake to irritate the lining membrane of the intestines by drastics, in diseased conditions in which the absence of all irritation—mental as well as corporeal—ought to be inculcated; and this remark applies especially to fevers, which are apt to be accompanied by unusual irritation in the mucous membrane of the stomach, and small intestines. The plan, to be pursued in such cases, seems to be clearly indicated,—to attack the local inflammation, and the general increased action, by bleeding—general and local—and by the use of refrigerants; to keep the canal free by cathartics of the mildest kind,—as a teaspoonful of the oleum ricini, repeated at intervals if necessary,—and, under this system, the issue is, according to the author's experience, far more fortunate than where much irritation is kept up in the intestinal canal. Reflection, indeed, suggests, at a glance, the impropriety and inconsistency of any irritating plan of medication in fever. We carefully employ sedative agents; recommend the most careful abstraction of light, and sound, and the avoidance of all irritation, *except*, that which we officiously excite in a part of the system, which, as Broussais has properly maintained, possesses intimate sympathetic relations with every other part of the organism; and, under this mode of management, many cases of continued and remittent fever, doubtless, run their course to a fatal termination, which, under a better system of treatment, would have terminated in health. It must be borne in mind, that, in these cases, the objection is not to cathartics in the abstract. The employment of mild cathartics to keep the alimentary tube entirely free from all morbid secretions must be regarded as one of the most important points in the management of fevers, that are even accompanied with an unusual degree of erethism of the gastro-enteric mucous membrane. It is the powerfully irritating cathartic—that excites evacuation after evacuation, and exhausts the patient by irritation—which is so objectionable. The author is satisfied, that many cases of continued and remittent fever have arrived at a happy termination by the treatment above recommended, which might have eventuated unfortunately, had the irritating cathartic agency, so strongly inculcated by several distinguished teachers and authors, within so late a period as the last fifty years, been adopted. If we cast our eyes over the periodicals, which are daily emanating from the press, we find, that such agency is beginning to be less and less invoked, although the attention of the practitioner is equally directed to the gentle removal of all offending matters from the intestinal canal. Laxatives, or gentle cathartics—in other words—have taken the place of the more violent, and the improvement has been signal.

In fevers of the synochal or inflammatory kind, unaccompanied by much gastro-enteritic irritation, more powerful cathartics may be employed, the object being to use them as depleting agents, as well as for the purpose of evacuating offending matters. In such cases, recourse is had, more commonly, to saline cathartics, which, by exciting the action of the exhalents of the mucous membrane generally, occasion the evacuation of a portion of the more watery parts of the blood.

It has been generally inculcated, that whenever the evacuations are fetid or ill-conditioned, it is necessary to repeat the cathartic, until their natural healthy character is restored; but if the alimentary canal be kept clear from the commencement of the disease, it can rarely happen, that this fetid character will be marked, or to such an extent as to demand much attention. Besides, it must be recollected, that they may be rendered ill-conditioned by the employment of these very agents. When the mild chloride of mercury, for example, is exhibited for some time, it modifies the secretion from the different grandular and follicular organs, and gives occasion, as before mentioned, to green or dark coloured evacuations—*calomel stools*—very much resembling chopped spinach. This has, of course, to be borne in mind, as under the idea just mentioned, which prevails largely amongst those who do not reflect, the cathartic might be repeated, with the view of removing the very condition which it has induced. Professor Chapman has recommended, that, in obstinate remittent and intermittent autumnal fevers, cathartics should be continued until dark, tarry, fetid stools are discharged. This dark appearance, he conceives to be a glutinous matter, which adheres to the intestines, and requires cathartics for its removal; but it appears by no means clear, that it may not be, in part, the effect of the repeated employment of cathartics deteriorating the intestinal secretions, in the manner referred to.

From what has already been said, it will obviously be improper to administer violent cathartics in yellow fever; which, if not remittent, is often accompanied by malignant gastritis or gastro-enteritis.

In intermittents.—In intermittents, cathartics are rarely employed for cutting short the disease. The impression they make upon the nervous system is not sufficiently intense to break in upon the morbid catenation. They are generally employed in such cases, for the purpose of removing the contents of the alimentary tube, so as to prepare the way for the administration of cinchona, or of some of its preparations, or of other antiperiodics; and in the progress of the affection, they are had recourse to—as in other maladies—for removing morbid secretions, or whenever the bowels are in such a condition as to require their employment.

In all cases, where a doubt may exist as to the propriety of prescribing cathartics, there may be none as to the exhibition of enemata. They are, indeed, invaluable agents, where the powers of life are so much reduced, that a rational fear is entertained as regards the administration of cathartics by the mouth. Even when food has not been taken, the canal must be kept free; as the vitiated secretions, and the product of the digestion of the different substances poured into the digestive tube, cannot fail, by their retention, to add to the irritation.

In eruptive fevers.—In all the exanthemata, the employment of gentle cathartics is indispensable to their judicious management. In small-pox, measles, scarlatina, &c.,—where the cutaneous surface is affected with erethism,—the extension of the skin, constituting the mucous membranes, and especially the gastro-intestinal, cannot fail to participate in the general morbid condition; to have its secretions depraved; and, consequently, to require the administration of evacuants.

With regard to the kind of cathartic best adapted for febrile affections in general, there is none perhaps so available as the oleum ricini. Next to this, the different salines, especially sulphate of magnesia; and, if stronger cathartics are required,—which, as has been remarked, happens far more rarely than has been imagined—the *pulvis jalapæ compositus*—which consists of jalap and bitartrate of potassa; or combinations of jalap and calomel, or of rhubarb and calomel, may be administered. Where the object is, as in fever, to remove all offending matters daily from the alimentary canal, and not to excite a powerful revulsion, or a copious exhalation from the mucous membrane, the most unirritating agents ought obviously to be chosen, and, of these, the oleum ricini is decidedly the best.

In thoracic and abdominal inflammation.—Cases of thoracic inflammation do not exhibit any signal advantage from the employment of cathartics. These can only act by virtue of their depletory or revulsive properties, and their administration must be guided by general principles; but, in inflammatory affections of the contents of the abdomen, or of its lining membrane, great care and discrimination are required to decide upon their utility, or the contrary.

In *peritonitis*, whether implicating the peritoneum proper, or its extensions investing the intestines, cathartics have to be employed with caution, for fear the irritation excited, during their operation, should add to the inflammation. In such cases, Dr. William Saunders was in the habit of saying, that the best mode of opening the bowels—in enteritis especially, which is usually attended with constipation—is the use of the lancet; and if this be followed up by a full sedative dose of opium, the bowels will often respond without the aid of any cathartic. The constipation is, in such cases, dependent upon the inflammation, and when this—the cause—is removed, the effect yields also. Where the enteritis is seated in the mucous coat, irritating purgatives should be given with extreme care. A case, indeed, can scarcely be imagined, in which they can be indicated; yet, the exhibition of a gentle cathartic,—simply with the view of keeping the canal free from morbid secretions, and morbific matters, which cannot fail to be present in such a diseased condition of the lining membrane,—is amongst our most valuable means of medication. This is signally the case in *dysentery*,—in which the inflammation is chiefly seated in the lower portion of the intestinal tube,—and in the early stages of *cholera*, common as well as spasmodic.

In *diarrhœa* which arises from irritation of the lining membrane of the intestines, it was at one time the custom to employ no agents of any kind. The disease—as already remarked—was looked upon as an effort of nature not to be interfered with; whilst by others, an opposite view has been maintained, and astringents have been advised from the commencement. Of the two views, the latter is more markedly erroneous, and mischievous in its consequences. The disease is one of irritation, and the exciting cause is often seated in the intestines themselves: accordingly, it may be maintained, as an almost universal rule, that gentle cathartics should be exhibited in the first instance, and be repeated if necessary; and that astringents should not be used, unless an asthenic condition should supervene,—like the gleet, which generally succeeds to acute inflammation of other mucous membranes.

If the propriety of the use of gentle cathartics in the case of diarrhœa affecting adults be admitted, the remark must apply *à fortiori* to the diarrhœa of infants, who are extremely liable to erethism of the dermoid tissue, and to the formation of acid in the primæ viæ, which has often, probably, considerable agency in the development of the disease; hence the acid smell of the evacuations. Often, too, accompanying this state, there are manifest indications of an inflamed condition of the gastro-intestinal mucous membrane.

In dyspepsia.—In the variety of dyspepsia, which consists of an irritated condition of the lining membrane of the stomach, violent cathartics are improper; but laxatives may be,—and usually are,—indicated. Indeed, in atonic dyspepsia, the same system is advisable, and an occasional brisk cathartic may be exhibited with advantage. When employed in this manner, a fillip is given to the digestive function, which is often salutary; whilst if the cathartic be often repeated, a degree of sensibility and irritability may be induced in the bowels, which cannot fail to add to the mischief.

In hepatic diseases.—In hepatic phlegmasia, engorgement, or torpor,—cathartics have been regarded as eminently useful, by acting immediately on the radicles of the portal veins, and thus diminishing the quantity of fluid, that passes to the liver by the vena porta. From what has been remarked, regarding the use of emetics in jaundice, and in cholelithus or gallstone, it will be understood, that cathartics may have a beneficial agency, by stimulating the intestinal tube,—the excitation being conveyed by continuous sympathy to the liver and its accessaries; but where there is organic mischief, as happens in most of the protracted cases, especially such as occur in those of broken-down constitutions, they must be given with caution.

In constipation.—Of the utility of cathartics in constipation we have already spoken. They ought not—as there stated—to be administered in such doses as to act as powerful local stimulants, on account of the depression which always succeeds to the superexcitation. The proper mode is to prescribe them in small doses, often repeated, accompanying them by a properly regulated diet. A brisk cathartic may obviate the constipation for the time, but no permanent cure can be effected, without striking at the root of the evil, by a proper and protracted laxative treatment and regimen.

In colic.—In the different varieties of colic, cathartics have been much employed. The intestinal pain is generally caused by over-distension of the coats by flatus, or by accumulated or irritating aliments; and the method usually adopted for removing the disease is to excite the peristaltic action of the intestines, so as to diffuse the flatus over a larger surface, or to remove the source of irritation. This may often be effected by a union of cathartics with aromatics, or, when the pain is extremely violent, by the substitution of an opiate for the aromatic, to allay the spasm, which forms a part of the disease. Perhaps in all cases of colic, the best course is to premise a full dose of an opiate, and afterwards to administer a cathartic by the mouth or rectum, should this be necessary.

In hemorrhage.—The rules, that guide us in the administration of cathartics in hemorrhage, vary according as it is of the active or passive kind. In the former, they may be proper; in the latter not. In apoplexy, they are employed both as depletives and revellents; but more for the latter purpose than the former. During the apoplectic seizure, one of the best revellents is a stimulating enema, and this can be administered when deglutition is impracticable. Croton oil is also given under similar circumstances. If a drop of this be put upon the tongue, it passes by imbibition into the blood-vessels, and seeks out the intestinal canal for its operation, by virtue of that singular action of preference, of which there are so many marked examples.

In the *epistaxis*, that occurs about the period of puberty, the depletion and revulsion, produced by a common dose of sulphate of magnesia, is often sufficient to put a stop to it; and, whenever signs of vascular activity exist,—as in other hemorrhages,—cathartics are clearly suggested. The same may be said of their employment in cases of *hæmoptysis*, although mental and corporeal quiet are absolutely necessary during the attack, and for some time afterwards; but, in the interval, no doubt can arise as to the propriety of their administration. The saline cathartics, which operate upon the whole of the intestinal canal, and augment the exhalation from the mucous membrane, ought to be selected.

In *hæmatemesis* or *vomiting of blood*, whilst cathartics have been strongly recommended by some, they have been as warmly reprobated by others. The German practitioners generally object to them; yet the objection does not appear to be well founded. A saline cathartic, by acting upon the whole of the intestinal canal, developes a succession of sympathies, during its operation, that derives greatly from the concentration of vital activity towards the stomach, which is present in active hæmatemesis. Besides, certain of the saline preparations,—as before shown,—are somewhat astringent: the supersulphate of magnesia, of potassa, or of soda, for example,—which may be formed extemporaneously, by adding the elixir of vitriol, or the dilute sulphuric acid, to a solution of sulphate of magnesia, of sulphate of soda, or of sulphate of potassa,—comes in contact with the vessels pouring out the blood by rhexis or diapedesis, and by its directly astringent properties arrests the hemorrhage, whilst the agency of the cathartic may prevent its recurrence. It has been stated, elsewhere, that many cases of hæmatemesis are dependent upon obstruction in some other organ than the stomach,—and especially in the uterus; and, where there is torpor of this last viscus—such as exists in many, if not in most, cases of amenorrhœa—the action of the cathartic is well adapted for communicating a salutary excitation to the uterine functions, through contiguous sympathy.

In *menorrhagia*, care has to be taken in the administration of cathartics, owing to the fact just mentioned,—that they excite the action of the uterus by the sympathy of contiguity; but, in *hæmaturia*, such cathartics as are not accompanied with a diuretic operation may be beneficially employed,—the derivation of nervous and vascular influx from the urinary organs being attended with good effects. With this view, the oleum ricini is had recourse to with much advantage.

In hemorrhoids.—In hemorrhoids, the mildest kinds of cathartics are serviceable, whilst the more violent are injurious. Obviously, too, such cathartics should be avoided as act upon the lower portion of the alimentary tube, unless some addition be made to them, which rids them of their objectionable features. Accordingly, when aloes is given, it is generally in small doses, and with the addition of some narcotic,—as hyoscyamus. The mild chloride of mercury is a cathartic, which generally acts more energetically upon the upper portion of the intestines; but, with some, it irritates the rectum, and, consequently, such individuals should avoid its use, when affected with hemorrhoids or any disease of the rectum. Castor oil, and sulphur, are the best laxatives in such cases. These remarks apply equally to procidentia ani, in which drastic cathartics could not fail to do mischief.

In pregnancy.—In pregnancy, powerful cathartics must be avoided, for reasons that have been previously assigned.

In head affections.—In various head affections, and especially in *encephalitis*, whether involving the brain or its membranes, or both,—cathartics would clearly be advantageous, by virtue of the revulsion they effect, did not the inconveniences, to which the patient is subjected by the motion necessarily attendant on their operation, often preclude their employment.

In *mania*, they are, at times, absolutely required, in consequence of the torpor, that occasionally exists in the intestinal tube. Owing to this cause, an accumulation sometimes takes place in the large intestines to a surprising extent, and the use of the scoop is required to remove the indurated fæces that have collected in the rectum; after which, injections of cold water may be thrown into the large intestine to restore its tone.

Owing to the torpor of the nerves of the tube, or rather to the cerebral abstraction and excitation, which prevent the usual sensitive impressions from being duly appreciated, the most violent drastics are occasionally demanded—as oleum tiglii, or elaterium, —and even these are often ineffectual, unless blood-letting be premised, which, by reducing the nervous energy, enables smaller doses to produce the wished-for operation. Sometimes, considerable difficulty is experienced in the administration of any remedy by the mouth,—the patient obstinately closing the jaws, and resisting every effort to separate them. This determination may frequently be broken in upon—especially after blood-letting—by pressing strongly on the parotid gland, which occasions so much pain, that the maniac yields, and the jaw is depressed.

In the neuroses.—In all the neuroses, it is important to keep the intestinal tube free; as irritations, seated there, react upon the cerebro-spinal axis, and add to the mischief.

Hysteria, which is ranked, though improperly, by Pinel, in accordance with antiquated notions, as a *névrose de la génération*, is often associated with this condition of the bowels; and therefore requires the use of cathartics. Great nervous torpor of the whole system is also present in many cases of this protean malady, requiring the administration of cathartics as revellents, both by the mouth, and rectum.

Under the head of emetics it was remarked, that irritations of the stomach and bowels, produced by improper diet or by morbid secretions, are a grand exciting cause of *epilepsy*, as well as of *infantile convulsions*. Cathartics are, therefore, almost universally proper in these alarming attacks; but care must be taken not to repeat them sufficiently often to develope the sensibility of the tube, as they might react on the cerebro-spinal axis, and augment the very mischief they were administered to remove.

Chorea—a disease of the nervous centres, accompanied with great torpor of the digestive function—requires a union of tonics with cathartics for its removal. Dr. Hamilton, of Edinburgh,—an authority, who has been the cause of much valuable use, and at the same time, of much abuse of the cathartic medication—places his main reliance on cathartics, in the cure of this singular affection.

One of the varieties of *trismus*—the *trismus nascentium*—or 'lockjaw of the new-born', is often dependent upon irritations seated in the intestinal canal, and is occasionally removable by gentle cathartics, as the oleum ricini. In this part of the globe, it is rarely witnessed; but, in the warmer regions, it is a fatal malady. At the Havana, according to Don Ramon de la Sagra, of one hundred children, dying under ten years of age, nineteen per cent. amongst the whites perish of it within the first seven days, and twenty-four per cent. amongst the infants of colour. There, the affection is called the 'disease of the seven days' (*mal de los siete dias*).

In violent cases, of *tetanus* in the adult, cathartics constitute one of the agents to which recourse is almost invariably had, along with other, and more essential remedies,—as narcotics. When swallowing is impracticable, stimulating enemata are often administered, with the view of exciting a new impression by revulsion; or opium is given in the same manner, where the object of the practitioner is to endeavour to overpower, by sedatives, the inordinate erethism of the cerebro-spinal axis. When deglutition can be effected, a union of cathartics and opiates is often employed to fulfil similar views. The oleum tiglii is, in these cases, a useful cathartic, both when deglutition exists, and when it is impracticable.

In dropsies.—Cathartics are amongst the most valued, and valuable agents in the treatment of dropsies, especially when these are of an active kind. In the passive, they must necessarily be used with more caution. The division of cathartics, to which recourse is had, is that of drastics,—such of those especially as produce copious watery discharges,—or which, in other words, act powerfully on the secretory apparatus of the mucous membrane of the alimentary canal. Elaterium is one; but it must be cautiously administered, on account of the difficulty that exists in regulating its operation. Calomel, and gamboge are often selected for this agency. These hydragogues—as before mentioned—act in two ways, in the curation of dropsy; first, they diminish the amount of circulating fluid, and thus add to the activity of imbibition; and secondly, they excite a powerful revulsion, which gives rise, indirectly, to a sorbefacient agency.

In intestinal worms.—Cathartics are often employed as anthelmintics; but their main effect can only be the removal of existing worms; they do not prevent their re-formation; besides, if often given, they may debilitate the system generally, and the digestive function in particular, and thus favour the predisposition to the development of those parasites; but, on the other hand, an occasional brisk cathartic may give rather than diminish tone, by breaking in upon the monotonous execution of functions, and exerting a salutary impression of excitation.

Such are the chief disorders and purposes, for which cathartics are administered. It is obviously almost as impracticable, as it is unnecessary, to refer to every case, in which their employment may seem to be indicated. Their main effects on the general system are,—depletion and revulsion; and a wise discrimination will suggest the particular cases, in which such agency is demanded. Their immediate effects upon the parts with which they come in contact are obvious; and a very slight degree of reflection—after the pathological lesion has been correctly appreciated—will enable the practitioner to decide as to the propriety of their administration.

SPECIAL CATHARTICS.

I. *Laxatives or Mild Cathartics.*

1. MANNA.

Manna is the concrete juice of *Ornus Europæ'a*, *Frax'inus Ornus*, or *Flowering Ash;* Sex. Syst. Diandria Monogynia; Nat. Ord. Oleaceæ (*Lindley*); a native of the south of Europe, especially of Calabria and Sicily. It is chiefly obtained by making incisions in the stem. It also issues in part spontaneously from fissures, and in part from punctures made by an insect, the *Tetti-go'nia Orni* or *Cica'da Orni.* The juice, as it issues, is nearly colourless, and somewhat viscid; but it soon concretes in the sun into a yellowish opaque substance.

Some of it is permitted to fall on the ground, or on leaves placed to receive it, or to trickle down the trunk; but where care is taken the leaves of the ornus are stuck into the bark below the incisions, which guide it to receptacles formed of leaves of the *Cactus Opun'tia* or Indian Fig; and straws and twigs are inserted into the incisions so that the juice concretes in the form of stalactites, and is readily detached clear from the bark. The collection of manna commences in July, and continues till October,—the best kind being obtained during the month of August, or in the height of the season; and the inferior qualities towards the close.

Manna is imported chiefly from Palermo and Messina, but likewise from various parts of Italy and Sicily. The quantity, on which duty was paid in England, in 1839, was 13,493 lbs. (*Pereira*).

There are several varieties of manna met with in commerce. The one which is the purest, is Flake Manna—*Manna Cannulata*—which is in irregularly shaped pieces resembling stalactites, and obtained in the manner above mentioned. It is light, brittle, of a white or pale yellowish white colour, has a faint, rather pleasant odour, and a sweet somewhat peculiar taste, becoming ultimately rather acrid. When broken, flake manna has a crystalline or granular structure.

Manna in sorts or *Common Manna* consists of whitish or yellowish fragments similar to the last variety, but smaller, and mixed with a soft, viscid, uncrystallized brownish mass, like that which constitutes the commonest variety—the fat or fatty manna, which is in the form of a soft viscous mass, of a dirty yellowish-brown colour, containing few crystalline fragments, and full of impurities. Under the name Sicilian Tolfa Manna, Dr.

Pereira describes an inferior kind, corresponding to the manna in sorts. It is thought by him to correspond in quality to **Tolfa Manna**, produced near Civita Vecchia, and which is but little valued.

Manna has frequently been subjected to analysis, and been found to contain about 60 per cent. of a peculiar sweet principle called *mannite;* a little common sugar, partly crystalline and partly uncrystallizable; extractive matter, and about 32 per cent. of moisture.

The extractive matter, which is nauseous, has been regarded as the laxative principle; yet mannite would seem to be as laxative as manna itself.

Manna, like sugar, is nutritive; but, it is not used with us on account of this property. It is a gentle laxative, but does not always act without inducing tormina. By females and children it is occasionally taken alone; but more frequently it is prescribed as an adjunct to other remedies of the same class; as senna, and sulphate of magnesia, whose taste it somewhat conceals, whilst it adds to their cathartic agency. According to the author's taste, however, the addition of the manna is no improvement.

The dose of manna, for an adult, is from one to two ounces; for children from one to three drachms. In the case of the former it may be eaten: of the latter, it may be taken dissolved in water, simple or aromatic, or in tea or coffee.

Mannite.—Mannite has been brought forward as one of the "new remedies." It is obtained by treating manna in tears with boiling alcohol; then filtering and suffering it to crystallize: by rest and refrigeration mannite is precipitated in small, beautiful, white needles.

It is used under the same circumstances as manna, and the dose is much the same. (See the author's *New Remedies*, 3d edit. p. 331: Philad. 1841.)

2. SULPHUR.

Sulphur, of the Pharmacopœia of the United States, is the *sublimed sulphur* of some other pharmacopœias. It is found both in the inorganic and the organized kingdom. In the former, it occurs either imbedded in rocks—*common native sulphur;* or produced by volcanic action—by sublimation—*volcanic sulphur*. In the organized kingdom, it is found in many plants; in the liliaceæ, for example, in garlic; in the cruciferæ, in mustard; and in assafœtida of the umbelliferæ. It is also found in certain animal substances, as eggs, urine, &c. In combination, in the state of sulphuric acid, it occurs extensively.

Sulphur may be procured by purifying native sulphur, or by decomposing the native sulphurets; but the sulphur of commerce is generally obtained in the former way. It is brought chiefly from Italy and Sicily. During the year 1834, not less than 507,808 cwt. of rough brimstone were imported into England, of which 485,756 cwt. were from Italy, or rather Sicily. (*McCulloch's Dictionary of Commerce.*)

Native sulphur is met with in small quantities in different parts of the United States.

Crude sulphur is prepared from native sulphur, either by being subjected to a rude process of fusion, or by a process of distillation in earthen pots. In this state, it is imported and purified. The process, formerly adopted, was to submit it to fusion in an iron cauldron; where the earthy impurities subsided, and the liquid sulphur was ladled out and cast into moulds, so as to form the *roll sulphur* or *roll brimstone.* The improved method of purification is to distil it in an iron still, the sulphur being allowed to pass into a chamber, on the walls of which it is deposited, in the form of *flowers of sulphur.* If, instead of permitting the sulphur to enter the sulphur chamber, it be made to pass into an appropriate receiver, the sulphur distils over, and condenses into a liquid, which, when solidified, constitutes the *refined sulphur* of commerce. If this be cast in wooden moulds, it forms the *stick* or *roll* or *cane sulphur* or *brimstone.* (*Pereira.*)

Flowers of sulphur, or solid sulphur, may be prepared from the metallic sulphurets, by similar processes.

The dregs that remain after the purification of sulphur, constitute *sulphur vivum,* formerly used externally; but now never employed except by the veterinary surgeon. It has hence obtained the name of *horse brimstone.*

Sublimed sulphur, prepared by any of these methods, contains more or less sulphuric acid, owing to some of it undergoing combustion. This can be removed by washing, after which we have the *sulphur sublimatum lotum* of certain of the pharmacopœias, and of the United States Pharmacopœia of 1830. In the last edition, however, SULPHUR means the sublimed article; and SULPHUR LOTUM, or *washed sulphur,* sublimed sulphur thoroughly washed with water. As met with in the shops, it is in fine powder, of a bright yellow colour, and of a peculiar smell and taste. It is insoluble in water, but soluble in alcohol, ether, and the oils, both fixed and volatile. It is wholly volatilized by heat, and ought not to change the colour of litmus paper.

Sulphur is one of the gentlest laxatives; producing scarcely any augmented secretion from the follicles and exhalents of the intestines. Being so mild in its action, it has been given in cases of pregnant females; and is a common laxative in hemorrhoidal affections. When it is necessary to add to its cathartic agency, magnesia or bitartrate of potassa may form the adjunct. The great objection to sulphur is, that even its internal use occasions the patient to exhale a disagreeable sulphurous odour, owing to the formation of sulphuretted hydrogen. Sulphur in combination with bitartrate of potassa, or alone, mixed with molasses, has long been a favourite 'purifier of the blood,' and has been given, spring and fall, in families for this purpose. Its dose, as a cathartic, is from ʒj to ℥ss. It may be given, as before remarked, in molasses, or diffused in milk.

SULPHUR PRÆCIPITA'TUM, PRECIPITATED SULPHUR or *lac sulphuris*, prepared by decomposing a sulphuret of lime, by means of chlorohydric acid, was officinal in the British Pharmacopœias, and is still so in that of the United States. It possesses no advantages over sulphur lotum. It is much whiter, and in a state of fine division. It is said to be exceedingly liable to adulteration, and, on this account, has been left out of the British Pharmacopœias. According to Dr. Pereira, in the preparation of nearly the whole of the precipitated sulphur, sulphuric acid is substituted for the chlorohydric, by which the product contains about two-thirds of its weight of sulphate of lime; and he adds, that he was informed by an extensive manufacturer of the article, that a firm, whose name he mentions, was almost the only one that bought the pure kind.

Pure precipitated sulphur, like sublimed sulphur, is wholly volatilized by heat.

3. MAGNE'SIA.—MAGNESIA.

Magnesia, calcined or *burnt magnesia* is prepared by exposing carbonate of magnesia to a red heat in an earthen vessel, until the carbonic acid is wholly expelled, and the protoxide of magnesium remains.

It is a light, white powder, devoid of smell, and almost tasteless. Its specific gravity is 2.3. When moistened with water, it exhibits an alkaline reaction. It is very sparingly soluble in water, and less so in boiling water than in cold. It absorbs carbonic acid; and, therefore, should be kept from contact with air.

The tests of its purity, as given in the Pharmacopœia of the United States, (1842,) are, that it should dissolve wholly without effervescence in dilute chlorohydric acid; this would prove the absence of carbonate of magnesia, with which it is often mixed, and that the solution in dilute chlorohydric acid should yield no precipitate with oxalate of ammonia, or chloride of barium, proving the absence of lime and of sulphates.

Magnesia is a gentle laxative, and as such is employed in pregnancy, affections of the rectum, &c., where mild aperients are needed. It is especially valuable where constipation is attended with cardialgia from too great a secretion of the gastric acids; and in children it forms an admirable laxative, owing to the great predominance of acid with them. It is also readily taken by them, when mixed with milk, and sweetened. It is an excellent adjunct to carminative mixtures, where it is advisable to increase the peristole of the bowels; and is often prescribed for this purpose to children. (*Magnes.* gr. xv; *Ol. anisi*, seu *Ol. carui* gtt. iij; *Aquæ* ℥i; *Sacchar.* ʒi. M. Dose, a tea-spoonful occasionally.)

Where diarrhœa is attended with acidity, as it often is, magnesia may be needed to facilitate the removal from the bowels of the redundant acid; but where it is desirable to neutralize the acid, and at the same time to induce a constipating effect, prepared chalk should be prescribed.

The dose of magnesia, as a cathartic, to an adult is from a scruple to a drachm; to infants from two to eight or ten grains. Occasionally, it does not operate, owing to its not meeting with acid in the stomach, when its action may be facilitated by drinking lemonade, which forms a citrate of magnesia that acts as a mild aperient.

It is proper to remark, that where magnesia has been taken for a long time, and in large quantities, it has occasionally accumulated in the bowels, and given rise to unpleasant effects.

4. MAGNE′SIÆ CAR′BONAS.—CARBONATE OF MAGNESIA.

Carbonate of magnesia, *subcarbonate of magnesia*, or *magnesia alba* occurs, although not in great abundance, as a mineral; but that of the shops is prepared on the large scale by decomposing sulphate of magnesia by an alkaline carbonate; the consequence of which is the precipitation of carbonate of magnesia. As it is prepared by the wholesale chemist, no formula for it is given in the Pharmacopœia of the United States. The greater part of that which is used in this country is imported from Scotland. In New England, it is prepared from the bittern of the salt works, which consists chiefly of sulphate and muriate of magnesia; and in Baltimore, it is made from the sulphate of magnesia extensively prepared there. (*Wood* and *Bache.*)

Carbonate of magnesia is a light, white, inodorous, and almost insipid powder. It is nearly insoluble in water, but readily dissolves in aërated or carbonic acid water. It is distinguishable from pure magnesia by effervescing with acids. Its adulterations are the same as those of magnesia, and may be detected nearly in the same manner.

The therapeutical properties of carbonate of magnesia are almost the same as those of magnesia. As, however, it contains carbonic acid, this is set at liberty, when the salt meets with acid in the stomach, and is apt to excite flatulence. Its dose, as a laxative, is from half a drachm to a drachm, given in milk, with which neither it nor magnesia mixes well without great care. Its admixture is facilitated by first rubbing it with syrup.

A *fluid magnesia* has been much recommended of late by Sir James Murray, and Mr. Dinneford. The preparation of the latter is said to contain from 17 to 19 grains of carbonate of magnesia in every fluid ounce. It is a *condensed solution of magnesia* in carbonated water.

5. FICUS.—FIGS.

Figs, in the Pharmacopœia of the United States, mean the dried fruit of *Ficus Ca'rica,* the Fig Tree, which is a native of Asia and Southern Europe, but cultivated in the gardens of this country. The figs, when ripe, are dried in the sun or in ovens, and are afterwards packed in drums, baskets or boxes. They are chiefly brought to the United States from Smyrna; and the Turkey or Smyrna figs are the largest and sweetest; and therefore the best. Dried figs form a very considerable article of commerce in Provence, Italy and Spain, besides affording, as in the east, a principal article of sustenance for the population. The annual importation into Great Britain has been estimated at about 20,000 cwt. (*McCulloch.*)

The chief constituents of figs are mucilage and sugar of figs, which greatly resembles the sugar of the grape.

Like other saccharine articles, figs are laxative; and, by virtue of their mucilage, they are demulcent likewise. They are eaten in cases of habitual torpor of the bowels; and they enter into the composition of the *Confectio Sennæ* of the Pharmacopœia.

The split fig retains heat well, and is, therefore, occasionally applied to inflammatory tumours to promote suppuration.

6. CAS'SIA FIS'TULA.—PURGING CASSIA.

Cassia Fistula is the fruit of *Cas'sia Fis'tula, Cathartocar'pus Fis'tula, Pudding pipe tree* or *Purging Cassia;* Sex.

Syst. Decandria Monogynia; Nat. Ord. Leguminosæ, which is supposed to have been originally a native of Upper Egypt and India, whence it has spread to various places. It is now found abundantly in Hindusthan, China, the East India and West India Islands, and in South America.

The fruit—the officinal portion—as imported from the East and West Indies and South America—is in pods, from nine inches to two feet in length, which are cylindrical, slightly curved, and of a dark brown, nearly black, colour. Internally, the pod is divided into numerous thin transverse partitions,—and each of these contains a hard, flattened, oval-shaped seed, surrounded by a soft, black pulp resembling an extract.

CAS'SIÆ FIS'TULÆ PULPA, PULP OF PURGING CASSIA, is separated by pouring boiling water on the bruised pods to soften the pulp; then straining first through a coarse sieve, and afterwards through a hair one, and boiling down to a proper consistence. When subjected to analysis, the common or African variety yielded 61 per cent. of sugar; the American 69 per cent.

Cassia pulp is laxative in a small dose; in a larger it is purgative, but it does not act kindly; being apt to induce nausea, and tormina. It is rarely prescribed alone,—never perhaps in this country: but it enters as one of the laxative ingredients into the *Confectio Sennæ* of the Pharmacopœia of the United States. Its dose as a mild laxative is stated to be ʒj. to ʒij; as a purgative, ʒij. to ℥j.

7. TAMARIN'DUS.—TAMARINDS.

Tamarind is the preserved fruit of *Tamarin'dus In'dica;* Sex. Syst. Monadelphia Triandria; Nat. Ord. Leguminosæ, a tree which is indigenous in the East and West Indies. The fruit is a pod from two to six inches long, which consists of a ligneous husk, enclosing a pulpy texture, which is traversed by numerous branching fibrils, within which one or more seeds are imbedded. The officinal part is the pulp between the seeds and husk. It is usually imported along with the seeds and preserved in sugar. Tamarinds are brought to this country from the West Indies.

When subjected to analysis, the pulp yields citric, tartaric and malic acids; bitartrate of potassa; sugar, gum, vegetable jelly, parenchyma and water. It has an agreeable, sweetish acid taste, and readily imparts its properties to water.

Tamarinds are gently laxative; but they are rarely given alone. They were formerly prescribed with other cathartics, as with infusion of senna; but they have been considered—probably on insufficient grounds—to diminish the operation both of it and of the resinous cathartics. They form part of the *Confectio Sennæ* of the Pharmacopœia of the United States; for which purpose they are digested with a small quantity of water, until they become of uniform consistence; after which the seeds and filaments are separated by pressing through a hair-sieve. This is the **TAMARINDI PULPA** or *Pulp of Tamarinds* of the Pharmacopœia.

8. PRUNUM.—PRUNES.

Prunes are the dried fruit of *Prunus domes'tica,* the *Plum-tree;* Sex. Syst. Icosandria Monogynia; Nat. Ord. Rosaceæ; which is cultivated in temperate regions everywhere; but is supposed to be a native of Syria, especially near Damascus. The dried fruits are called *Prunes* or *French plums.* They are chiefly imported from the south of France, and are derived from the Saint Julien variety; the table prunes being obtained from the larger kinds of plum—as the Saint Catharine and the Reine—Claude or green-gage.

The fresh ripe fruit contains about twenty per cent. of solid matter, of which upwards of eleven per cent. is sugar, and five gum,—the remainder being constituted of the malic and pectic acids, albumen and ligneous fibre. (*Bérard*). The proportion of sugar, is increased in the process of drying; but this matter has not been investigated.

Prunes are laxative, and when taken in the evening are sufficient, with many, to cause the evacuation of the bowels on the following morning. Generally, they are taken stewed, as diet, in cases of costiveness, or in febrile and other diseases in which it is desirable to keep the intestinal canal gently free. The sugar and mucilage, which they contain, renders them also nutritious. They are sometimes added to cathartic infusions and decoctions to improve their taste and increase their effect.

The *Pulp of prunes,* **PULPA PRUNO'RUM,** is made by softening the prunes in the vapour of boiling water, and having separated the stones, beating the remainder in a marble mortar and pressing it through a hair sieve. It enters into the composition of the *Confectio Sennæ.*

9. SINA'PIS.—MUSTARD.

The seeds of *White mustard, Sina'pis alba,* unbruised, have been long recommended, in the dose of a table-spoonful, in cases of torpor of the digestive function. They had almost fallen into disuse, however, when Sir John Sinclair—the author of a "*Code of Health and Longevity*," published an article in a periodical, strongly recommending them to the aged, as a means for preserving their health, by stimulating the digestive function to greater activity, and at the same time keeping the action of the intestinal canal free. They may be taken three or four times a day, mixed with molasses. It would seem, however, that their use in such large quantities in torpid habits, is not totally devoid of danger. They have been known to accumulate in the cæcum and appendix cæci, and are said to have induced fatal inflammation of the stomach and bowels.

Besides the above officinal laxatives, there are some, which are occasionally used as such, but whose prominent effects are of a different nature. These will require but a passing notice.

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10. O'LEUM AMYG'DALÆ, *Oil of almonds;* and O'LEUM OLI'VÆ, *Olive oil.* The properties of these oils are described elsewhere. Both of them are mild laxatives in the dose of f. ℥j. to f. ʒj; although not often used as such. When prescribed, it is generally in affections of the alimentary canal, or of the genito-urinary apparatus, when it may be desirable to give laxatives, that will not enter into the blood-vessels, and irritate the kidneys or urinary passages. A common laxative for new-born children, in England, is a mixture of equal parts of *Oil of almonds* and *Syrup of violets*, or *Syrup of Roses*—the dose of which is a tea-spoonful; but olive oil, and simple syrup are equally effective.

II. *Purgatives, or Brisk Cathartics.*

O'LEUM RIC''INI.—CASTOR OIL.

The *Castor oil plant, Ric''inus commu'nis* or *Palma Christi;* SEX. SYST. Monœcia Monadelphia; NAT. ORD. Euphorbiaceæ, is probably a native of the East Indies, Greece and Africa, whence it was introduced into the West Indies and the American continent. It is now largely cultivated in many parts of the United States. In India, it is said to attain the height of fifteen or twenty feet; but in this country it does not exceed a few feet. The seeds ripen successively in August and September. They are of an oval shape, somewhat compressed, and of about the size of a small bean. Externally, they are smooth and shining, and of a pale gray colour, marbled with reddish-brown spots and stripes. In their general appearance, they have been likened to a tick, whence the name *Ricinus*. The husk, which constitutes 24 per cent. of the seed, is chiefly composed of ligneous fibre, with a little gum, resin, and extractive matter. The nucleus or kernel, which has been found to amount to 69 per cent. of the seed when dry, contains 46.2 of fixed oil, 2.4 of gum, 0.5 of soluble albumen and 20 of coagulated albumen. The fixed oil is the *Oleum Ricini.*

The quantity of castor oil used almost exceeds belief. Of 490,558 lbs. imported into England in 1830, 441,267 lbs. came from the East Indies; 39,408 lbs. from the British Northern Colonies of America; 5,139 lbs. from the United States: and 4,718 lbs. from the British West Indies. (*M'Culloch.*) A large proportion of that used to the east of the Alleghanies, comes by way of New Orleans, from Illinois and the neighbouring States, where it is so abundant as to be sometimes burnt in lamps. (*Wood & Bache.*)

The mode in which castor oil is prepared in this country is as follows:—The seeds, being cleansed from all extraneous matters, are put into a shallow iron reservoir, and submitted to a gentle heat, not greater than can be readily borne by the hand; the object of which is, to render the oil sufficiently liquid to be easily expressed. They are then introduced into a powerful screw-press, by which process a whitish oily liquid is obtained, which is transferred to clean iron boilers, supplied with a considerable quantity of water. The mixture is boiled for some time, and the impurities being skimmed off, a clear oil is left on the top of the water, the mucilage and starch being dissolved in the water, and the albumen coagulated. The clear oil is removed, and the process completed by boiling it with a small proportion of water, continuing the application of heat till aqueous vapour ceases to rise, and till a small portion of the liquid, taken out in a vial, is perfectly transparent when it cools. The effect of this last operation is said to be—to clarify it, and render it less irritating by driving off the acrid volatile matter. If the heat be carried too far, the oil acquires a brownish hue, and an acrid taste, similar to the West India oil. One bushel of good seeds yields five or six quarts, or about 25 per cent. of the best oil. (*Wood & Bache.*)

Castor oil, which is obtained by expression without heat, is called *cold-drawn castor oil.*

Recently prepared castor oil, or *oil*, as it is often called, is inodorous and nearly insipid; colourless, or of a pale straw colour; thick, but perfectly transparent. It is lighter than water; grows rancid by keeping; thickens, and its colour becomes of a reddish-brown. It has a hot nauseous taste; is completely soluble in absolute alcohol, and in pure sulphuric ether, differing, in this respect, from all the ordinary fixed oils, except palm oil. Hence, alcohol is recommended in the Edinburgh Pharmacopœia to test its purity. In this country, however, the oil is so common, that there is no inducement to adulterate it. It has often been examined by the chemist, but the source of its cathartic powers has not been discovered.

Castor oil seeds are possessed of acrid cathartic properties, and are said to have proved fatal when taken to the extent of 20 at once. The acrid principle is considered to be dissipated by the heat of boiling water; but it is more probable that it exists in the covering of the kernel, inasmuch as the cold-drawn castor oil does not appear to be more active than that which is prepared by heat. It has been seen, indeed, that long continued heat developes acridity.

Castor oil is one of the most valuable of the mild cathartics, operating by virtue of a special affinity for the mucous membrane of the bowels; for when injected into the veins—as was done by a respectable physician of this country, (page 133), it produced griping and purging, and what was more surprising, the taste of castor oil was experienced. It is one of the most speedy in its operation, and, accordingly, is well adapted for all cases in which it is desirable to evacuate rapidly the contents of the bowels. It is apt, however, to induce nausea and vomiting, and this sometimes renders it inapplicable.

As elsewhere remarked, its cathartic action is not by any means in a ratio with the dose; hence, in cases in which it is merely desirous to evacuate gently the bowels, a tea-spoonful or two will often operate as effectually as a larger quantity, and, of course, with less probability of exciting nausea. The author is constantly in the habit of giving it in teaspoonful doses, especially where there is erethism of the mucous membrane of the bowels, and the dose is generally sufficient. For children, it is unquestionably one of our most satisfactory cathartics, and is in constant use in domestic practice, the only objection being its nauseous taste.

The ordinary dose of castor oil is considered to be an ounce, or about two tablespoonfuls; rarely, however, can more than a tablespoonful be needed. For children, the ordinary dose is a teaspoonful. It is so exceedingly disagreeable to many persons, that they can scarcely be prevailed upon to take it; and, under such circumstances, if it reaches the stomach, it is apt to be rejected. As in other cases, however, if the dose be repeated immediately, it may be retained. To obviate its unpleasant taste, it may be dropped in a little aromatic water, spirit and water, hot coffee, or hot milk, and the mouth may be rinsed with some of the vehicle before it is swallowed. It is not unfrequently made into an emulsion with the yolk of egg or mucilage and some aromatic water. (*Ol. ricini*, ʒvj; *vitell. ovi*, seu *mucilag. acac.* ℥ss; *aquæ menthæ pip.* ℥v.—Dose, a fourth part every two hours until it operates.) Oil of turpentine aids its action materially, but renders it still more disagreeable. Should it be indicated, two drachms may be added to the above mixture. Not unfrequently, where nausea and vomiting are anticipated, or intestinal irritation exists at the same time, ten drops of laudanum may be added to the dose of oil.

RHEUM.—RHUBARB.

Rhubarb is the root of *Rheum palma'tum*, and other species of Rheum; Sex. Syst. Enneandria Monogynia; Nat. Ord. Polygonaceæ. The botanical history of this drug, long and extensively as it has been known and employed, is still unsettled. Different varieties have been referred to different species of rheum, diffused over the Asiatic continent, yet still its pharmacological history is undetermined. (*Pereira, Christison, Wood & Bache.*)

The chief varieties of rhubarb root met with in commerce are the *Chinese*, *Russian*, and the *European*. Dr. Pereira, however, states, that he is acquainted with six kinds—the *Russian*, the *Dutch-trimmed*, the *Chinese*, the *Himalayan*, the *English*, and the *French*.

The Chinese, or East India Rhubarb, constitutes the largest portion of that which is used in this country. It is brought either directly from Canton, or by Singapore and other ports of the East Indies. As we meet with it, it is either in round or flattened pieces; seems smooth, as if it had been scraped; and is generally perforated with holes, in many of which are found pieces of the cords by which they had been suspended. It is more heavy and compact than the Russian variety; the smell too, is much less powerful, and the colour of the powder of a more dull yellow or brownish cast.

The Russian, Turkey, Moscow, Bucharian or Siberian Rhubarb, is imported from St. Petersburg; and is said to have been formerly shipped from the Turkish ports, to which it was brought from Tartary, by caravans, through Persia and Natolia. Hence, it was often called *Turkey Rhubarb*. The Bucharian merchants have entered into a contract with the Russian government to supply it with rhubarb in exchange for furs. It is carried by them to Kiachta, a frontier town, where it is inspected by a Russian apothecary, employed there for the purpose. The worm-eaten portions are rejected, and the others are bored to ascertain their soundness. The portions which do not pass examination are burned, and the rest is sent on to the Russian capitol.

The size and shape of the pieces are various,—the external appearance seeming to show, that the cortical portion had not been scraped as in the Chinese Rhubarb, but had been cut off longitudinally by the knife; hence the angular appearance of the surface. The smell and taste are essentially those of the Chinese variety, excepting that it is somewhat more aromatic. The aroma is considered, however, to be so delicate, that in all wholesale drug houses, a pair of gloves is kept in the Russian Rhubarb drawer with which to handle the pieces. (*Pereira.*) When chewed, both it and the Chinese variety feel gritty under the teeth, owing to the presence of numerous crystals of oxalate of lime. The colour of the powder is a bright yellow, without the orange tinge of the Chinese.

As the Russian is much more expensive than the Chinese variety, the latter is sometimes cut so as to resemble it; but the fraud may be detected by attention. Dr. Wood states, that he has seen parcels of very good rhubarb imported from Canton, which were evidently prepared so as to resemble the Russian; but in most, if not all, of the pieces which came under his notice, the small perforating hole was found, which characterises the Chinese rhubarb, although in some instances it had been filled with the powdered root so as to conceal it. This was probably the DUTCH-TRIMMED, or BATAVIAN RHUBARB, which is imported from Canton and Singapore. (*Pereira.*) Sometimes the worm-eaten pieces are made to resemble the sound by filling up the holes with a mixture of powdered rhubarb and mucilage, and covering over the surface with the powder; but, by removing this, the fraud is detected. (*Wood & Bache.*)

At times, too, the eastern varieties are mixed with the European; the last of which is easily distinguishable by its weaker aroma, and want of grittiness when chewed. It is not easy, however, to detect the admixture, if the rhubarb be in a state of powder, and the adulterating article be in small quantity. (*Christison.*)

The EUROPEAN RHUBARB is much inferior to that which is brought from Russia and China. In England two kinds are met with in the shops under the name of ENGLISH RHUBARB, one *dressed* or *trimmed*, so as to resemble the Russian; the other, sometimes called *stick rhubarb.* It is raised in various parts of England, but chiefly near Banbury in Oxfordshire, and is distinguished from the Asiatic varieties by being externally of a reddish hue, and having brownish spots of adhering bark, and internally a looser, softer, spongy texture, with occasional cavities, especially in the centre. It is pasty under the pestle. In taste and smell, it resembles the Asiatic rhubarb; but is more mucilaginous, and does not, like them, feel gritty under the teeth. The *stick rhubarb* is in irregular pieces, about five or six inches long, and an inch thick. Its taste is astringent, but very mucilaginous. Both varieties of English Rhubarb are said to be extensively employed by druggists to adulterate the powder of Asiatic Rhubarb. (*Pereira.*)

Rhubarb is likewise cultivated largely in France, especially at an establishment called Rheumpole, near the port of Lorient.

The quantity of rhubarb consumed is very great. In the year 1831, there were imported into England from Russia 6,901 lbs.; from the East Indies, 133,462 lbs.: of this quantity, 40,124 lbs. were retained for home consumption. (*McCulloch.*)

The medical virtues of rhubarb are yielded wholly to water and to alcohol. It has been repeatedly subjected to chemical analysis, but the results have not been of much pharmacological interest. They show that it contains, along with its cathartic constituents, a bitter principle, and astringent matter, consisting of tannic and gallic acids, to which a portion of its medical virtues is referable.

Rhubarb is one of the most valuable cathartics, seeming to act upon the whole tract of the intestines, and not causing any very copious secretion from the lining membrane. It is, consequently, one of the mildest of the class. Owing to its containing tannic and gallic acids, it is somewhat astringent, and the common opinion is, that it is first an evacuant to the bowels, and afterwards an astringent. Its bitter principle, too, gives it tonic properties, and hence, in small doses it is prescribed whenever a joint tonic and laxative agency is needed. Like many other cathartics, its action is often accompanied by tormina, which may be obviated by the addition of some aromatic.

Associated with other cathartics it forms one of the most common prescriptions of the physician. It is often given, especially in infancy, combined with magnesia or its carbonate, which is said to remove the constipating influence, that rhubarb, given alone, exerts after it has acted as a cathartic. United with the mild chloride of mercury, and an appropriate corrigent, it is an active cathartic, and one very commonly prescribed. (*Pulv. rhei* gr. xv; *hydrarg. chlorid. mit.*, *pulv. zingib.* āā gr. v. M.

By roasting rhubarb, its cathartic power is diminished, and its astringency—it has been supposed—increased; hence, it is not unfrequently employed in diarrhœa and dysentery.

The dose of rhubarb, to produce a full operation, is from twenty to thirty grains; in smaller doses, it acts as a laxative. The European varieties require to be given in twice the quantity. When not given in this form, one of the following officinal preparations may be prescribed:

INFU'SUM RHEI, INFUSION OF RHUBARB. (*Rhei*, cont. ʒj; *Aquæ bullient.* Oss.) The dose of this infusion, as a laxative, is f. ℥j. or f. ℥ij; but it is rarely given alone. It is commonly used as a vehicle for other cathartics or tonics, or for magnesia, when used as an antacid.

PIL'ULÆ RHEI, PILLS OF RHUBARB. (*Rhei*, in pulv. ʒij; *sapon.* ʒij; divide in pil. cxx.) Generally taken at bed-time as a laxative. Dose, two or three repeated on the following morning if necessary.

PIL'ULÆ RHEI COMPOS'ITÆ, COMPOUND PILLS OF RHUBARB. (*Rhei*, pulv. ℥j; *Aloës*, pulv. ʒvj; *Myrrh.* pulv. ℥ss.; *ol. menth. piperit.* f. ʒss; *Syrup. aurant.* q. s. ut fiant pil. cclx.) The aloes adds to the activity of the rhubarb; but it is not easy to see what can be the effect of the myrrh; the oil of peppermint is a corrigent, which prevents the cathartics from griping. It is a good laxative pill, in the dose of two to four taken at bed-time.

SYR'UPUS RHEI, SYRUP OF RHUBARB. (*Rhei* contus. ℥ij; *Aquæ bullient.* Oj; *Sacchar.* lbij. made into a syrup.) Given in the dose of a tea-spoonful or two to infants as a laxative. It is not so freqently administered, however, as the following:

SYR'UPUS RHEI AROMAT'ICUS, AROMATIC SYRUP OF RHUBARB. (*Rhei*, contus. ℥iiss; *Caryophyll.* contus. *Cinnam.* contus. āā ℥ss; *Myristic.* cont. ʒij; *Alcohol. dilut.* Oij; *Syrup.* Ovj. made into a syrup. It may be prepared also by the process of displacement. See the *Pharmacopœia of the United States*, 1842.) This is much used in domestic practice, under the name of *spiced syrup of rhubarb*, in the bowel affections of children, especially in those, that occur during the summer and autumnal months. The aromatics and the alcohol impart excitant properties to it, and render it carminative and laxative. The dose for an infant is a tea-spoonful or two.

TINCTU'RA RHEI, TINCTURE OF RHUBARB. (*Rhei*, cont. ℥iij; *Cardam.* cont. ℥ss; *Alcohol. dilut.* Oij. It may be prepared also by the process of displacement.) The cardamoms are added as a corrigent. In the dose of f. ℥ss. to f. ℥j. it proves cathartic. In lesser doses, it is sometimes taken as a stomachic and laxative.

TINCTU'RA RHEI ET ALOES, TINCTURE OF RHUBARB AND ALOES. (*Rhei*, cont. ʒx; *Aloës*, pulv. ʒvj; *Cardam.* cont. ℥ss; *Alcohol. dilut.* Oij.) This is the relic of the ancient *Elixir sacrum*. It combines the cathartic virtues of both rhubarb and aloes. The dose, as a cathartic, is from f. ℥ss. to f. ℥j.

TINCTU'RA RHEI ET GENTIA'NÆ, TINCTURE OF RHUBARB AND GENTIAN. (*Rhei*, cont. ℥ij; *Gentian.* cont. ℥ss; *Alcohol. dilut.* Oij. It may also be made by the process of displacement.) By combining the tonic virtues of the gentian, this tincture is employed as a tonic and laxative, in doses of from f. ʒi. to f. ℥ss.; in larger doses, f. ℥i. to f. ℥ij. it is cathartic.

TINCTU'RA RHEI ET SENNÆ, TINCTURE OF RHUBARB AND SENNA, (*Rhei*, cont. ℥j; *Sennæ*, ʒij; *Coriandr.* cont.; *Fœnicul.* cont. āā ʒj; *Santal.* rasur. ʒij; *Croci*, *Glycyrrhiz.* āā ʒss; *Uvar passar.* demptis acinis, ℔ss; *Alcohol dilut.* Oiij.) This polypharmacal production is an imitation of *Warner's Gout Cordial.* The rhubarb and senna are cathartics; the coriander and fennelseed excitants, and therefore corrigents; the red saunders and saffron are mere colouring matters; the liquorice and raisins communicate sweetness to the tincture. It is an agreeable stomachic and laxative, especially in the flatulence of the gouty, and such as have been addicted to the use of wine or spirituous liquors. The dose is f. ℥ss. to f. ℥ij.

VINUM RHEI, WINE OF RHUBARB. (*Rhei*, contus. ℥ij; *Canellæ* contus. ʒj; *Alcohol. dilut.* f. ℥ij; *Vini*, Oj. Canella is an excitant and corrigent; and the wine is applicable to the same cases as the *Tinctura Rhei.* The dose is from f. ʒiij. to f. ℥j.

13. AL'OË.—ALOES.

Aloes is the inspissated juice of the leaves of *Al'oë spica'ta*, and other species of aloe; Sex. Syst. Hexandria Monogynia; Nat. Order, Liliaceæ. The London Pharmacopœia refers it to Aloë spicata alone; the United States Pharmacopœia (1842), with more propriety, to that as well as other species. It is generally believed, indeed, that three species furnish the different kinds in the market. *Aloë spica'ta*, *A. vulga'ris*, and *A. Socotori'na*, and it is considered probable, that at least two other species are employed,—the *A. Commeli'ni* of Willdenow, and *A. linguæform'is* of Thunberg.

The information, which we possess as to the sources of aloes, is still unprecise. Within a few years, the drug has been imported into England from Bombay, Arabia, Socotora, Madagascar, the Cape of Good Hope, the Levant, and the West Indies, and it would seem, that the aloes of British commerce is derived more or less from most, if not all, these places directly or indirectly. (*Christison.*)

The finest aloes is obtained by inspissating the juice, which flows spontaneously from transverse incisions made in the leaves. If pressure be used, the juice becomes mixed with the mucilaginous liquid of the leaves, and an inferior kind of aloes is the result. A still inferior kind is prepared by boiling the leaves, after the juice has escaped, in water.

In England, no less than seven varieties of aloes are met with —the *Socotrine*, *Hepatic*, *Barbadoes*, *Cape*, *Mocha*, *Caballine*, and *Indian*, (*Pereira.*) In this country, we rarely see more than three, the *Socotrine*, the *Cape of Good Hope*, and the *Hepatic*. (*Wood & Bache.*)

Socotrine Aloes ought to be obtained from the Island of Socotora, in the Straits of Babelmandeb, but much that is sold under that name has been procured from other places. It would appear, that in 1833 the quantity exported from that island was two tons.

The name Socotrine Aloes is often given to the best specimens of aloes, no matter whence obtained. Both in Spain and the West Indies, the juice, inspissated in the sun, bears this name. (*Wood & Bache.*) It would appear, however, that the commercial value of the real Socotrine aloes is now below that of Barbadoes aloes, than which it is perhaps inferior in activity. (*Pereira.*)

Socotrine aloes is of a yellowish or reddish-brown colour, which becomes deepened by exposure to air. The fracture is smooth, glassy, conchoidal; yet, even when of excellent quality, it often breaks with a roughish fracture. The powder is of a golden yellow colour. The odour of fresh broken pieces, especially when breathed on, is fragrant according to some; it is certainly peculiar, and perhaps, to the mass, not unpleasant. The taste, like that of all the aloes, is intensely and enduringly bitter, but perhaps it is somewhat less disagreeable than the other varieties.

Cape of Good Hope or Cape Aloes, is imported, as its name shows, from the Cape of Good Hope into Great Britain, whence it is again imported into the United States, and is the variety chiefly used in this country. It differs materially in its appearance from the Socotrine aloes, having a shining resinous aspect, whence its name of *Al'oë lu'cida* with the Germans. It is of a deep-brown colour, approaching to black, and has a glossy or resinous fracture. When held up to the light its edges appear translucent, and have a yellowish-red or ruby colour. The powder is of a greenish-yellow colour. Its odour is stronger and more disagreeable than that of the preceding variety.

Hepatic or Barbadoes Aloes is imported from Barbadoes or Jamaica in gourds. Its colour varies from a dark-brown or black to a reddish-brown or liver colour. The fracture is sometimes dull, at others, glossy. The powder is of a dull olive-yellow colour. The odour, especially when breathed upon, is exceedingly disagreeable and nauseous. It is known that this variety is obtained from *Aloe vulgaris*. It is but little used in this country except for horses.

A variety of aloes, called GENUINE HEPATIC ALOES, LIVER-COLOURED SOCOTRINE ALOES, is exported from Bombay, and would appear to be an inferior variety of the Socŏtrine. The two are sometimes, indeed, intermixed.

The composition of aloes has been investigated by many distinguished chemists, Trommsdorff, Bouillon-Lagrange, Vogel, Braconnot, and Winkler. It was for a considerable period regarded as a gum-resin, but it is questionable, whether it contain strictly either gum or resin. Its most important constituent is a bitter extractive matter, termed *aloësin*, which, according to Trommsdorff, forms 75 per cent. of Socotrine aloes, and 81.25 of Barbadoes aloes. Some specimens of the latter did not, however, contain more than 52 per cent. There is, in addition to this, a resinoid substance, the proportion of which varies from 6.25 to 42 per cent.—and which has been considered oxidized extractive.

The most important point, in a pharmacological point of view, is, that aloes yields its medical virtues to cold water; a dark-brown substance, however, being left, which is dissolved by boiling water, but is deposited again as the water cools. This is the resinoid substance. Its best solvent is dilute alcohol.

Aloes is more extensively used than any other vegetable cathartic. It forms the basis of most cathartic pills. Its action appears to be exerted on every portion of the canal, but especially on the large intestines. Even when placed in contact with an abraded surface, it exerts its wonted effect on the bowels; affording an example of that special affinity between particular therapeutical agents and particular portions of the economy of which we have so many examples. In large doses, it is apt to irritate the rectum, and is therefore improper for those who are suffering under piles, and in pregnancy. When, however, it is associated with hyoscyamus, its injurious agency, in the latter condition especially, is obviated. (*Aloës*, in pulv. ℥j; *Ext. hyoscyam.* ℈j. —M. et divide in pilulas xx.—Dose, two at bedtime.)

In its operation, aloes does not stimulate greatly the cutaneous exhalents, and hence the evacuations are not as watery as those produced by many other cathartics. It is rarely, however, given alone; being usually associated with other cathartics, and with some essential oil or other excitant, to prevent the griping, which it is so apt to occasion. It is affirmed, too, that certain substances, although not possessed of any cathartic property, increase the cathartic action of aloes. Several vegetable bitters, especially sulphate of quinia, and likewise sulphate of iron have been considered to act in this manner. Dr. Christison states, that he has not been able to remark the property in sulphate of quinia, but that it is undoubtedly possessed by sulphate of iron,—one grain of aloes with two or three grains of that salt producing as much effect as two or three grains of aloes alone, and with much less tendency to irritate the rectum. The attention of the author has been drawn to this point, but he has not been able to speak so positively as Dr. Christison. It can be understood, however, that any tonic combined with a laxative may have the effect of aiding the operation of the latter, by the greater energy it communicates to the digestive operations.

The bitter extractive of aloes renders it at the same time tonic, and hence its usual association in "dinner pills" with tonics, where it is advisable to have a joint tonic and laxative action.

Aloes is rarely given where a speedy action on the canal is needed. Its operation is gradual, and hence, as well as by reason of its exceedingly nauseous taste, it is generally given in the form of pill. Its action is by no means in proportion to the dose; and, accordingly, it may be prescribed with impunity even to children in very large doses. The author was first induced to employ aloes so largely from the very high eulogiums he had heard pronounced upon it by Dr. Hamilton, late Professor of Midwifery in the University of Edinburgh, to whom the idea of administering it freely in diseases of children, was suggested by observing, in an apothecary's shop, where he had been placed by his father for the purpose of being practically instructed in Pharmacy, that the *Syrup of buckthorn*—so called—which they were in the habit of vending to mothers of families to be given to their children, was usually formed extemporaneously of aloes dissolved in treacle or molasses; and upon making inquiries of those who had purchased it, he found that no bad effects had resulted from its administration; he, consequently, formed the determination of trying it in his own practice, when he found it to be not only a successful agent after other means had failed, but also, that it was rarely rejected by the stomach, acted mildly, was perfectly safe, and but seldom objected to by young infants. The author has elsewhere detailed cases in his own practice, as well as in that of others, in which two drachms of powdered aloes were taken in this form in two successive days, without any griping or unpleasant symptom, and with full relief to the constipation. (*Commentaries on Diseases of the Stomach and Bowels of Children*, p. 92, Lond. 1824.)

The dose of aloes, as a purgative, is from five to ten grains or more; as a laxative, two or three grains in the form of pill.

PILULÆ ALOES, ALOETIC PILLS.—(*Aloes*, pulv. *Sapon.* āā ℥ij. Divide in pil. ccxl.) The soap is added with the view of assisting the solution of the aloes, so as to cause it to act on the whole intestinal tract, rather than on the rectum. Five pills contain ten grains of aloes; so that two at bedtime will usually produce a laxative effect on the following day.

PILULÆ ALOES ET ASSAFŒTIDÆ, PILLS OF ALOES AND ASSAFETIDA. (*Aloës*, pulv., *Assafœtid.*, *Saponis*, āā ℥ss.; divide in pilulas clxxx.) The assafetida is added as an excitant; and the pill is given in constipation accompanied by flatulence, and impaired tone of the stomach and intestines. Dose, two to five.

PILULÆ ALOES ET MYRRHÆ, PILLS OF ALOES AND MYRRH.—(*Aloës*. pulv. ℥ij; *Myrrh*, pulv. ℥j; *Croci*, ℥ss; *Syrup*, q. s. ut fiant pil. cccclxxx.) These are the old *Pilulæ Rufi* or *Rufus's pills*. They are frequently used by females labouring under catamenial obstruction, which is generally attended by more or less atony and constipation; the myrrh being regarded as an emmenagogue. The dose is from three to six.

PULVIS ALOES ET CANELLÆ, POWDER OF ALOES AND CANELLA. (*Aloës*, ℔j; *Canellæ*, ℥iij.) This is the old *Hiera picra* or '*holy bitter*,' which has long been much used in domestic practice as an emmenagogue. The canella is excitant and therefore prevents the griping tendency of the aloes; but like the last preparation, this is no more emmenagogue than any of the other combinations of aloes; all of which—as elsewhere remarked—affect the uterus only by contiguous sympathy, through their action on the lower part of the intestinal canal.

TINCTURA ALOES, TINCTURE OF ALOES. (*Aloes*, pulv. ℥j; *Glycyrrhiz.* ℥iij; *Alcohol.* Oss; *Aq. destillat.* Oiss.) The same objection applies to the tincture of aloes as to the powder, and indeed to every form of administration except the pill. It is in the highest degree nauseous, and the liquorice renders it scarcely less so. Its dose, as a cathartic, is from f. ℥ss. to f. ℥iss.

TINCTURA ALOES ET MYRRHÆ, TINCTURE OF ALOES AND MYRRH. *Aloës*, pulv. ℥iij; *Croci*, ℥j; *Tinct. Myrrh.* Oij.) This is a relic of the *Elixir Proprietatis* of Paracelsus. It possesses the same medical properties as the Pilulæ Aloes et Myrrhæ,—the saffron being a mere colouring ingredient. Its dose is from f. ʒj, to f. ʒij. or more.

VINUM ALOES, WINE OF ALOES. (*Aloës*, pulv. ℥j; *Cardam.* cont., *Zingib.* cont. āā ʒj; *Vini*, Oj.) The wine of aloes is used in the same cases as the tincture;—the cardamom and ginger acting as corrigents.

Aloes likewise enters into other officinal formulæ, as the *Extractum Colocynthidis compositum;* the *Pilulæ Rhei com-*

positæ, the *Tinctura Benzoini composita*, and the *Tinctura Rhei et Aloës*—which are described elsewhere.

14. SENNA.

In the Pharmacopœia of the United States (1842), Senna is defined to be "the leaflets of *Cassia acutifolia* (*Delile*), *Cassia obovata* (*De Candolle*), and *Cassia elongata* (Lemaire, *Journ. de Pharm.*, vii. 345.)"

These plants belong, in the SEXUAL SYSTEM, to Decandria Monogynia; NAT. ORD. Leguminosæ. Confusion, however, still exists as to the precise species that yield the senna leaves of commerce.

The leaflets of *Cas'sia obova'ta*, which is a native of Egypt, Nubia, Syria, India, &c., and has been cultivated in Italy, Spain, and the West Indies, are said to form ALEPPO, SENEGAL and ITALIC SENNA, and to be one of the constituents of Alexandrian senna. Those of the *Cas'sia acutifo'lia*, which is a native of Egypt, in the valleys of the desert to the south and east of Assouan, are collected by the Arabs, and sold to the merchants, who convey it to Cairo. This is said to be the species that furnishes the TRIPOLI SENNA, and the greater part of the variety, known in commerce under the name of ALEXANDRIAN SENNA. Dr. Pereira, however, refers the Tripoli senna, which he thinks he has detected in Alexandrian senna, to the *Cas'sia Æthiop'ica*, which grows in Nubia, Fezzan to the south of Tripoli, and probably in Ethiopia.

The leaflets of Cassia elongata, which grows in India, is said to yield the TINNEVELLY and MECCA SENNAS.

The consumption of senna is considerable. The quantity on which duty was paid in England, in 1838 and 1839 was as follows; from the East Indies, in 1838, 72,576 lbs.; in 1839, 110,409 lbs.; from other places, in 1838, 69,538 lbs.; in 1839, 63,766 lbs. (*Pereira.*) The Mediterranean senna is brought chiefly to this country from Marseilles; the Indian variety comes either from Bombay or Calcutta, directly, or by the way of London, where it is purchased at the East India Company's sales. (*Wood & Bache.*)

The varieties that are brought to this country are the *Alexandrian*, the *Tripoli* and the *Indian.*

ALEXANDRIAN SENNA is an admixture of the leaflets of the species of cassia referred to in the Pharmacopœia of the United States. It is sold by compulsion to the Egyptian government, who resell it. It is collected in Nubia and upper Egypt, and is sent down the Nile to the great depôt of Boulak, near Cairo. It is of a grayish green colour; of a smell resembling somewhat that of tea, and a viscid taste. It has a broken appearance, and contains various extraneous matters, which are separated from it,—when it becomes what is termed *picked Alexandrian senna.*

Tripoli Senna resembles, in appearance, the Alexandrian, than which it is much cheaper. It is more broken up, however; and, although very active, is less esteemed. The common opinion is, that it is carried to Tripoli in caravans from Fezzan; but, under the belief that the leaflets are furnished by Cassia acutifolia, which differ, however, in some respects, from those in the Alexandrian senna, and taking into consideration the greater cheapness of the Tripoli senna, Dr. Wood is of opinion, that it grows upon the Mediterranean coast of Africa, in the vicinity of Tripoli.

Of the Indian Senna, there are two varieties; 1, the Tinnevelly Senna, or the *finest East Indian Senna,* which is cultivated at Tinnevelly in the southern part of India. It is a fine unmixed senna, is extensively employed, and brings a good price. It consists of large unbroken leaflets, of a fine green colour, from one to two inches or more long, and at times half an inch broad at their widest part. 2. An inferior or second East Indian senna, the Mecca Senna, or Pike Senna, which is cultivated in Arabia, and finds its way to Bombay. It is in long leaflets, narrower than those of Tinnevelly senna, and of a yellowish colour; some of the leaflets being brownish or even blackish. It is occasionally mixed with pods, and with stalks and dust. (*Christison, Pereira.*) Different adulterations of senna have been pointed out by pharmacological writers, but they do not appear to apply to the sennas of this country, which are sufficiently pure.

Senna yields its virtues to water—warm or cold; and to alcohol—pure or dilute; hence water and dilute alcohol are the menstrua employed in officinal preparations. It has, 1, an odorous principle—*volatile oil of senna*—which of course is lost by boiling. This has a nauseous odour and taste; and appears to possess some cathartic power,—the distilled water acting as a mild cathartic:—2, a purgative principle, to which the name *cathartin* has been given; three grains of which cause nausea, griping and purging.

The active principle is precipitated by infusion of galls, and probably by other astringents, as well as by a solution of subacetate of lead; but these substances could scarcely be combined in the same prescription.

Senna has a special affinity for the lining membrane of the intestines; for its infusion proves cathartic when injected into the veins; and the infant at the breast is purged by it, after the mother has taken it; hence it must have passed into the circulation of the latter. It might, therefore, operate both by direct contact, and indirectly through the circulation. It is a safe, active, and rapid cathartic; hence its value, alone, or associated with other articles, that act speedily, where such action is desirable. The objection to it is its nauseous taste, and tendency to induce vomiting, and especially severe griping. The corrigents, generally used to obviate these objectionable qualities, are aromatics and saccharine matters, which last have been considered the best of all. (*Christison.*) They appear, too, to be modified by combining it with certain other cathartics. Like other cathartics, too, its purgative effect seems to be increased by a combination with tonics, yet the combination is rarely necessary, and therefore not often made, on account of the disagreeable character of the compound.

Senna is rarely given in powder, partly on account of the quantity necessary to produce the effect. From ʒss to ʒij is the average dose. Black tea and coffee have been advised to cover its disagreeable flavour.

INFU'SUM SENNÆ, INFUSION OF SENNA. (*Sennæ*, ℥ij; *Coriandr.* cont. ʒj; *Aquæ bullient.* Oj.) The coriander is added as a corrigent. *Senna tea* is a common domestic remedy, especially as a purgative for children, sweetened with sugar. It is most commonly, however, used as a vehicle for other cathartics, of the saline class especially. The well known *Haustus niger* or *black draught*—the terror of the invalid, by reason of its nauseous character—is a compound of this nature. It may be made as follows:—*Infus. sennæ*, f. ℥v; *aq. cinnam.* f. ℥j; *mannæ*, ʒiv; *magnes. sulphat.* ʒvj. Dose, an ounce and a half or more. The dose of the *Infusum sennæ* is f. ℥iv.

TINCTU'RA SENNÆ ET JALAPÆ, TINCTURE OF SENNA AND JALAP. (*Sennæ*, ℥iij; *jalap.* pulv. ℥j; *coriandr.* cont.; *carui*, cont. āā ʒss; *cardamom.* cont. ʒij; *sacchar.* ℥iv; *alcohol. dilut.* Oiij. It may be made, also, by the process of displacement.) This is one form of the old *elixir salutis*. The jalap is a cathartic adjuvant; and the aromatics, saccharine matter, and the menstruum itself act as corrigents. It is a carminative cathartic; and is employed occasionally, like the tincture of rhubarb, in costiveness attended with flatulence, especially in those of the gouty diathesis. It is more commonly used, however, as an adjunct and adjuvant to the infusion of senna. Its dose, as a cathartic, is from f. ℥ss to ℥j.

SYR'UPUS SENNÆ, SYRUP OF SENNA. (*Sennæ*, ℥ij; *Fœnic.* cont. ℥j; *aquæ bullient.* Oj; *sacchar.* ℥xv.) The syrup may be added to the infusion of senna, as an adjuvant and corrigent. It is well adapted, also, as a cathartic for children. Dose, f. ʒj to f. ʒiij.

CONFECTIO SENNÆ, CONFECTION OF SENNA. (*Sennæ*, ℥viij; *coriandr.* ℥iv; *glycyrrhiz.* cont. ℥iij; *Fic.* ℔j; *pulp. prun.*; *pulp. tamarind.*; *pulp. cassiæ fistul.* āā ℔ss; *sacchar.* ℔iiss; *aquæ* Oiv. Make into an electuary.) This is one of the forms of the *lenitive electuary*, long used as a laxative, especially in cases of pregnant females, in affections of the rectum, and wherever a gentle effect on the bowels is needed. The coriander and the saccharine matters act as corrigents to the senna; whilst the liquorice, figs, prunes, tamarinds, and pulp of cassia are, at the same time, laxative. The dose is from ʒij to ʒiv, taken at bed time.

Senna likewise enters into other officinal preparations, as the *tinctura rhei et sennæ*, and *syrupus rhei et sennæ* of the Pharmacopœia of the United States.

15. CAS'SIA MARILAN'DICA.—AMERICAN SENNA.

This is an indigenous perennial plant, Sex. Syst. Decandria Monogynia; Nat. Ord. Leguminosæ, from three to six feet high, with flowers of a beautiful golden yellow colour, which is very common in every part of the United States to the south of New York, growing most abundantly in flat ground on the margins of rivers and ponds. It is sometimes cultivated in the gardens for medical use. The leaves of *wild senna*—as it is often termed—are collected in August or the beginning of September, and carefully dried. It is in full bloom in the months of July and August.

In the shops of this country, the leaves are often met with in compressed cakes, as prepared by the Shakers; they have a feeble smell, and a disagreeable taste, somewhat resembling that of senna. They would appear to contain an active principle, similar to the *cathartin* of senna; and they yield their virtues to both water and alcohol.

The medical virtues of American senna are similar to those of the imported article; but it is not so active, requiring to be given in a dose about one-third larger. It may be prescribed, like senna, in the form of infusion.

16. JUGLANS.—BUTTERNUT.

Butternut is the inner bark of the root of *Juglans ciner'ea*, an indigenous forest tree known not only under the name of butternut, but also of *oilnut* and *white walnut;* Sex. Syst. Monœcia

Polyandria; Nat. Ord. Terebinthaceæ;—Juglandeæ, (*Lindley.*) It grows in the Canadas, and in the northern, eastern, and western parts of the United States; flowering in May, and the fruit ripening in September. The inner bark of the root, which is the officinal portion, is collected in May or June.

It is a gentle cathartic, resembling rhubarb in its operation, and was much used in the army of the United States during the revolutionary war. It is rarely, however, prescribed in the cities. It yields its virtues to water, and may, therefore, be given either in the form of decoction or of extract. The latter is officinal. Juglans itself is rarely if ever prescribed in substance.

EXTRAC'TUM JUGLAN'DIS, EXTRACT OF BUTTERNUT. (Prepared by evaporating the decoction of the inner bark of the root in coarse powder, or by the process of displacement.)

The extract often found in the shops is prepared, by the country people, from a decoction of the bark of the branches, and it is said even from the branches themselves. This may account for the uncertainty of its action. (*Wood & Bache.*) The dose is 20 or 30 grains.

17. PODOPHYL'LUM.—MAY APPLE.

Podophyllum, of the Pharmacopœia of the United States, is the rhizoma of *Podophyl'lum pelta'tum;* Sex. Syst. Polyandria Monogynia; Nat. Ord. Ranunculaceæ;—Podophylleæ, (*Jussieu*), an indigenous herbaceous plant, growing extensively through the United States, in moist shady places, and in low marshy grounds, and commonly known under the name of *May apple* or *Mandrake.* It flowers about the end of May or the beginning of June, and the fruit, which is sometimes preserved, ripens in the latter part of September. The root is collected after the leaves have fallen off.

As met with in the shops, it is in pieces about two lines thick, with broad flattened joints at short intervals; is wrinkled longitudinally, and of a reddish or yellowish-brown colour externally. Internally, it is of a whitish colour. Its taste is at first sweetish, afterwards bitter, nauseous, and slightly acrid. It yields its virtues both to water and alcohol.

The powdered root resembles jalap in its action, and may be used in the same cases and forms of combination. Its dose is about 20 grains.

EXTRAC'TUM PODOPHYL'LI, EXTRACT OF MAY APPLE. This extract is directed to be prepared in the same manner as the *Extractum*

Jalapæ, for which it might be substituted. Its dose as a cathartic is from five to fifteen grains; but neither it nor the podophyllum itself is much used by the profession generally.

18. HYDRAR'GYRI CHLO'RIDUM MITĒ.—MILD CHLORIDE OF MERCURY.

Mild Chloride of Mercury, *Submuriate of Mercury* or *Calomel*, is usually prepared by sublimation. According to the Pharmacopœia of the United States, a sulphate of mercury is first formed by boiling two pounds of mercury in three pounds of sulphuric acid, until the salt is left dry. This is then rubbed, when cold, with the remainder of the mercury, until they are thoroughly mixed. A pound and a half of chloride of sodium is now rubbed with the other ingredients till all the globules disappear. The mild chloride is then sublimed, and afterwards reduced to powder, and washed frequently with boiling distilled water, till the washings afford no precipitate upon the addition of solution of ammonia.

If no metallic mercury were added in this process, the sublimate would be the corrosive chloride.

As prepared in the above way, there is always some corrosive sublimate mixed with the mild chloride, which is removed by the washing directed in the process. With the same view, and to obtain it in a state of minute division, the mild chloride in vapour is made to come in contact with steam in the subliming vessel by which it is condensed.

Calomel is also occasionally made by precipitation, from a solution of *mercury* in *nitric acid*, as much as possible in the state of protoxide, and adding to it *chloride of sodium*. By this process, it is obtained in a state of very fine division.

When well prepared, the two calomels are essentially alike in therapeutical properties; but the one by sublimation is generally preferred. Neither one nor the other is made by the ordinary apothecary, but by the manufacturing chemist on a large scale.

Calomel, prepared in the ordinary mode by sublimation, forms a crystalline cake, the shape of which is dependent upon that of the subliming vessel. The crystals are square prisms. As seen, however, in the shops, it is in fine powder, devoid of taste and smell, and of a light buff colour. That, which results from the vapour being condensed by steam, is perfectly white. (*Brande.*)

It is wholly volatilized by heat, and is insoluble in water, alcohol and ether. By exposure to light it becomes darker coloured, and hence ought to be kept in a bottle coated with black paper or painted black. By the alkalies or alkaline earths, it is immediately blackened, owing to the formation of protoxide of mercury. Should it contain corrosive chloride,—when distilled water is boiled with it, a white precipitate will be caused on the addition of ammonia.

Mild chloride of mercury is in much use as a cathartic, and perhaps nowhere more so than in the United States. It has been elsewhere remarked, that it is one of the cathartics that do not act in a direct ratio with the dose; indeed, it often happens, that whilst three or four grains operate freely, twenty or thirty may exert but little agency. In the latter quantity it has been advised to allay irritability of the stomach or bowels in numerous diseases, and especially in spasmodic cholera, in which it has been administered in enormous quantities by some, under the idea that large doses act as a sedative. Yet this sedative influence—if it exist—must be confined within certain limits, otherwise the immense doses occasionally given—amounting even to drachms—ought to be attended with fatal consequences. It has been already shown, that according to the idea of Rasori, all cathartics act best in moderate doses, and that when they are given beyond a certain amount they prove sedative rather than cathartic.

Calomel is essentially a cholagogue cathartic, acting upon the upper part of the intestines more especially, and by contiguous sympathy upon the liver; hence its operation is often attended with a copious discharge of bile, which, as already remarked, may be no evidence that the individual is *bilious*, but merely that he has taken a cathartic, which acts upon the lining membrane of the duodenum, and thus augments the biliary secretion. The source of the green stools, or *calomel stools*, which succeed to its repeated employment, has been a subject of difference of opinion; they appear to be owing to a modified secretion of the whole glandular and follicular apparatus connected with the intestinal canal, all of which it certainly excites to greater action.

With many persons—perhaps with most—when taken to the extent of inducing purging, calomel causes more or less nausea, and at times vomiting; and not unfrequently its action is accompanied by griping. Notwithstanding these inconveniences, however, it is an excellent cathartic, especially when taken at night in the form of pill, and followed up by some saline or other cathartic, of more general and speedy action, on the following morning. It is likewise an excellent adjunct to other cathartics, and hence—where there is no special objection to its employment—it is a common and effective ingredient in most active cathartic pills.

It is also a very common cathartic for children, in consequence of the facility with which it can be administered. The only objection to it is, that in habits which are very impressible to the action of mercury, it is apt to affect the mouth, even when every precaution has been taken; and, in children especially, to induce stomatitis, with fœtor of the breath, increased flow of saliva, troublesome ulcerations, and, in rare cases, sloughing of the gums and cheeks, and even necrosis of the bones of the face. It is proper, however, to remark, that the author has noticed some cases in which these phenomena presented themselves where no mercury had been taken. Still, it must be admitted, that where a disposition exists to such stomatitis, it may be developed by the use of a calomel purge. The author has observed, that particular persons are unusually susceptible to mercury, and have the constitutional phenomena, pointed out elsewhere, induced by a very small quantity of it; and in public practice he has remarked, that at certain seasons or periods almost every patient in the wards of the hospital could be affected with mercury by the exhibition of a pill of a few grains of calomel, or even of the pilulæ hydrargyri. This disagreeable result has less to be apprehended under the age of two years,—children at that early age resisting the action of mercury, to which they are so susceptible at an after period.

Associated with opium, calomel is a valuable agent in many intestinal affections accompanied with constipation, or in which it is desirable to gently excite the action of the canal, to remove scybala or irritating matters; for example, in various species of colic; in enteritis after blood-letting—the opium acting as a sedative in the dose of two or three grains, and the same amount of calomel associated with it, then operating as a cathartic—and in diarrhœa, dysentery, &c. It is a cathartic often employed in cases of worms, appearing to act not simply by dislodging the parasites, but by proving, in some measure, anthelmintic.

In Great Britain, the ordinary dose of calomel as a cathartic is from two to five grains; and in France it is rarely given to this extent, whilst in this country the average dose may be stated at from five to fifteen grains. As already remarked, its action does not augment in a direct ratio with the dose. On the contrary, the author has instituted numerous experiments in public practice, and has found that, as a general rule, five grains are more certain in their operation than twenty. In all cases, when calomel does not act upon the bowels, another cathartic should be administered, as its retention may induce the constitutional effects of the remedy. Children generally require almost as large a dose as adults, a child of two years of age requiring three to five grains;—their intestinal canals not seeming to be more impressible to the action of this irritant than those of adults.

The United States Pharmacopœia has a form for the **PIL'ULÆ HYDRAR'GYRI CHLO'RIDI MITIS**, or *Pills of mild chloride of mercury*, in which the calomel is made into pills of one grain each by means of gum arabic powder and syrup. Calomel pills are generally, however, made extemporaneously with the same excipients or with confection of roses; and they have the advantage, that they separate more readily in the stomach; whilst calomel pills, that have been long kept in the shops, have been known to pass through the whole tract of the intestines unchanged.

Mild chloride of mercury is employed in the formation of the *Hydrargyri Oxidum Nigrum*, and it is one of the ingredients of the *Pilulæ Catharticæ Compositæ* of the Pharmacopœia of the United States.

19. PIL'ULÆ HYDRAR'GYRI.—MERCURIAL PILLS.

Mercurial pills or *blue pills* are formed by rubbing *mercury* with *confection of roses*, till all the globules disappear, and then adding *liquorice powder*, and beating the whole into a mass. In the Pharmacopœias of London and the United States, one grain of mercury is contained in three of the mass,—*blue mass*, as it is called from its colour.

Even at the present day, after much attention has been paid to the subject, it is a matter of dispute as to what is the condition of the mercury contained in this preparation, as well as in others where it is divided by friction with substances, not apparently adapted for exerting any chemical agency upon it,—as in the *Unguentum Hydrargyri*, and the *Hydrargyrum cum Cretâ*. Many distinguished chemists of the day are disposed to regard it as merely in a state of mechanical division. (*Bache, Pereira.*) In the absence of chemical proofs, it would be an objection to this view, that metallic mercury is admitted to be wholly without action on the living economy. It has been found recently, however, that the vapour disengaged from mercury at atmospheric temperatures contains some oxide; and it is affirmed by a distinguished pharmacological writer (*Christison*), that, during the last eight years, he has examined various samples of the *Unguentum Hydrargyri*, and has never failed to detect a sensible proportion of oxide in it; and "although the same fact," he adds, "has not yet been proved of the pill and powders of mercury, there is not yet any conclusive evidence to the contrary."

Although, therefore, the point is unsettled, it may be esteemed probable, that a portion at least of the divided mercury in the *Pilulæ Hydrargyri* has undergone oxidation. It was under the idea, that the metal is in the state of protoxide, that Mr. Donovan proposed, that the protoxide should be introduced into the materia medica. This is the **HYDRARGYRI OXIDUM NIGRUM** of the Pharmacopœia of the United States; the *Hydrargyri Oxidum*, of that of London, the *Suboxide*, *Ash*, *Gray*, or *Black oxide of mercury*. It is the precipitate thrown down from the mild chloride of mercury by means of potassa. (*Pharm. U. S.*) It is rarely, however, used internally; and owing to the occasional presence of the peroxide, is liable to operate harshly. (*Wood & Bache.*) Under another head, it will be seen, that it is employed externally as a mercurial revellent.

When the Pilulæ Hydrargyri are given as a cathartic, the dose may be five grains at night, followed by a draught of senna and sulphate of magnesia, or sulphate of magnesia alone on the following morning. Of itself, it will rarely act satisfactorily as a cathartic. The practice of administering it as above mentioned became common and empirical, greatly owing to the frequent recommendation of it by the late Mr. Abernethy in disorders of the digestive function; and the author has seen many cases in which mischief was produced thereby. A constant repetition of such agents is, indeed, as elsewhere remarked, well adapted for inducing all the characters of bilious affections, which, in the generality of cases, are, in strict pathology, derangements of the stomach and intestines; and it need scarcely be repeated, that too frequent a repetition of cathartics may give rise to the very evils, for the fancied removal of which they are administered.

An intelligent writer has properly animadverted on the mischief resulting from the constant call for "a blue pill at night and a pot of fæces in the morning."

SALINE CATHARTICS.

As the saline cathartics act much alike, they may be classed together. They are generally given much diluted with water. When concentrated, they would seem to have a physical, as well as a dynamic action. They extract water from the coats of the stomach and thence create thirst. Part of the solution becomes diluted in this way, and is absorbed; but the greater part passes into the intestines, dilutes the solid matters, and acts as a cathartic. (*Liebig.*)

20. MAGNE'SIÆ SULPHAS.—SULPHATE OF MAGNESIA.

Sulphate of magnesia is the common *Epsom salts*, or *Bitter purging salts*. It is a constituent of sea water, and of many mineral springs; and is found in some soils, sometimes efforescing in capillary crystals; and in this country is met with abundantly in many of the caverns on the west of the Alleghany mountains.

Formerly, Epsom salts were prepared exclusively from the Epsom waters by evaporation and crystallization, and the salt is still prepared from the springs of Seidlitz and Seydschütz. (*Christison.*) In Great Britain it is prepared either from the Dolomite or Magnesian limestone, by converting the carbonate of magnesia into a sulphate; or from the bittern left after the preparation of common salt, from which it is obtained by simple evaporation and crystallization. In Baltimore, it is extensively manufactured from *magnesite*—the siliceous hydrate of magnesia, which abounds in the neighbourhood of that city. It contains less lime than dolomite. These works supply the United States. Sulphate of magnesia is always prepared by the manufacturing chemist, and the quantity annually consumed, in the formation of magnesia, and as a therapeutical agent, is enormous.

Sulphate of magnesia—as met with in the shops—is sufficiently pure for medicinal purposes. It is in small acicular crystals; but by solution, and re-crystallization, tolerably large rhombic prisms, often truncated on the obtuse edges, and terminated by two or four converging planes, are obtained. The crystals are colourless, transparent, without smell, but of a bitter, disagreeable taste. The pure sulphate effloresces, but, owing to an admixture of muriate of magnesia, it occasionally deliquesces. It dissolves in its own weight of water at 60° Fahr., and three-fourths of its weight of boiling water. It is insoluble in alcohol.

Sulphate of magnesia possesses the characters of the whole class of saline cathartics, acting upon the entire tract of the intestinal canal, and increasing the secretion from the lining membrane, and at the same time the peristaltic action; so that the evacuations are numerous and watery. The great objection to it is its nauseous taste, yet it often remains on the stomach when other cathartics would be rejected. This is especially the case with a mixture of the sulphate of magnesia and the carbonate as in the following form:—*Magnes. sulphat.* ʒvj; *Magnes. carbonat.* ʒij; *Aquæ menthæ piperit.* ℥iiss. M. Dose, one half, to be repeated if necessary.

Alone, or associated with infusion of senna, it is one of the most common cathartics, both with the professional and the unprofessional. Like all the saline cathartics, (as elsewhere remarked,) it operates best when dissolved in a large quantity of water. The ordinary dose is one ounce; but in cases of constipation it is best to administer a small quantity—as a drachm—every morning, until the sensibility of the mucous membrane is developed to the necessary degree, which it generally will be sooner or later. The addition of diluted sulphuric acid, or of elixir of vitriol, so as to form a *supersulphate of magnesia*, adapts it as an excellent laxative and local stimulant in cases of hemorrhage from the stomach and intestines. In the dose of an ounce or two, it is prescribed as an adjunct to cathartic enemata.

21. SODÆ SULPHAS.—SULPHATE OF SODA.

Sulphate of soda, commonly called *Glauber's salts*, is contained in many mineral springs, and is produced artificially in several chemical processes. It is rarely, if ever, prepared by the apothecary, being manufactured on a very extensive scale by the wholesale chemist. It is made from the salt remaining after the preparation of chlorohydric or muriatic acid; which is sulphate of soda, usually with the addition of free sulphuric acid. To neutralize this, the London College directs carbonate of soda; the Edinburgh College, carbonate of lime. The latter is more economical. It would appear too, that in consequence of the enormous consumption of sulphate of soda, in the manufacture of carbonate of soda, the sulphate is sometimes made directly by the addition of sulphuric acid to chloride of sodium. In some of the northern states, particularly in Massachusetts, a portion of Glauber's salt is procured from sea-water in the winter season. During the prevalence of very cold weather, sulphate of soda, being the least soluble salt, that can be formed of the acids and bases present, separates in the form of crystals. (*Danl. B. Smith*, cited by *Wood & Bache.*)

Sulphate of soda is in colourless crystals, having the same crystalline form as sulphate of magnesia and sulphate of zinc, which it resembles in general appearance. It rapidly effloresces on exposure to the air, and ultimately falls into a white powder. It dissolves in three parts of water at 60°, and in one part at 212°; and is insoluble in alcohol. Its taste is cooling, but bitter and very nauseous, which is the great objection to it as an internal medicine. Owing to its cheapness, it is not subject to adulteration, and, as met with in the shops, is adapted for all therapeutical purposes.

In its medical properties, sulphate of soda is similar to sulphate of magnesia, which has now taken its place. When the author was a pupil in the North of England, the sulphate of soda being somewhat cheaper than the sulphate of magnesia, it was the common purgative with the people; whilst the latter, being somewhat less disagreeable, was used by the better classes. An ordinary *dose of salts* is one ounce: this may be taken dissolved in water to which a little dilute sulphuric acid, bitartrate of potassa, or lemon-juice has been added; or in mint water, which masks, in some degree, its disagreeable taste.

If in an effloresced state, or dried so that its water of crystallization is expelled, half the quantity will be a sufficient dose.

22. SODÆ ET POTASSÆ TARTRAS.—TARTRATE OF POTASSA AND SODA.

This salt, formerly called *Seignette's salt*, and still not unfrequently termed *Rochelle salt*, is made by neutralizing bitartrate of potassa with carbonate of soda; the excess of acid in the bitartrate being saturated by the soda of the carbonate, whilst the carbonic acid is disengaged.

It is in colourless, transparent crystals, which are prisms or halves of prisms, presenting six, eight or ten sides, and the primitive form of which is the right rhombic prism. It effloresces slightly in dry air, and is wholly and readily dissolved in five parts of boiling water. Its taste is saline and slightly bitter. It is not liable to adulteration.

Tartrate of potassa and soda is a mild refrigerant cathartic, and less disagreeable to the taste than the neutral salts generally employed. It is a constituent of the *Seidlitz powders*—so called—which consist of a mixture of two drachms of this salt, and two scruples of bicarbonate of soda, put up in a *white* paper; and of thirty-five grains of tartaric acid in a *blue* paper. These are dissolved separately in water, and taken in the state of effervescence.

The dose of tartrate of potassa and soda is from ℥ss. to ℥j.

23. SODÆ PHOSPHAS.—PHOSPHATE OF SODA.

This salt, sometimes called *tasteless purging salts*, is prepared from bone earth. A formula is given in the Pharmacopœia of the United States. In this, sulphuric acid is made to act upon bone ash, which consists of phosphate of lime united with some carbonate. In this manner, sulphate and superphosphate of lime result; the latter of which remains in solution,—the former being mainly precipitated. Carbonate of soda is then added; phosphate of lime is precipitated, and carbonic acid disengaged. The formation of crystals of phosphate of soda is promoted by a slight excess of carbonate of soda.

Phosphate of soda is in colourless transparent crystals, which speedily effloresce on exposure to the air, and are in oblique rhombic prisms. It has a mild saline taste, resembling that of common salt; has an alkaline reaction, and yields a yellow precipitate with nitrate of silver, which is soluble both in nitric acid and ammonia. It dissolves in four times its weight of cold, and twice its weight of hot water, and is almost insoluble in alcohol.

Phosphate of soda possesses the same virtues as the other saline cathartics, with this advantage, that its taste is far more agreeable. It may be given in soup or gruel, to which it communicates a taste like that of common salt. It may be given also to children more easily than any other cathartic of the class. By those, who considered it desirable to restore to the blood the saline matter, which it had lost in spasmodic cholera, the phosphate of soda was often selected as the saline agent.

The dose as a cathartic is from ℥j. to ℥ij.

24. POTASSÆ TARTRAS.—TARTRATE OF POTASSA.

Tartrate of potassa or *soluble tartar* is made by neutralizing the excess of acid in the bitartrate of potassa by the addition of a boiling solution of carbonate of potassa. The tartaric acid unites with the potassa, and the carbonic acid is disengaged, after which some insoluble tartrate of lime is separated by filtration; and the liquor is evaporated so that the tartrate may crystallize on cooling.

When properly prepared, it is in white crystals, which are somewhat deliquescent, or become moist in damp air; and are entirely soluble in their own weight of water. Its taste is saline, and somewhat bitter: most commonly, it is in a granular state, owing to the solution being evaporated to dryness.

Tartrate of potassa is a mild cathartic; but is rarely given alone. It is sometimes added to other cathartics as the infusion of senna, the griping effects of which it is said to correct like the saline cathartics in general. It is occasionally administered as a refrigerant laxative in febrile affections.

The dose, as a laxative, is a drachm or two; as a purgative, ℥ss. to ℥j.

25. POTASSÆ BITARTRAS.—BITARTRATE OF POTASSA.

Bitartrate of potassa, *supertartrate of potassa*, *acidulous tartrate of potassa* or *cream of tartar* is the *crude tartar*, *argol* or *impure supertartrate of potassa* purified. Tartar exists in grape juice, but as it is very slightly soluble in alcohol and water, it is deposited when alcohol is produced, and forms an incrustation on the sides of the wine casks. This is purified on a large scale, in France, by solution and crystallization, and it is from that country, that we receive it. The purest salt is obtained by dissolving that which has been purified, gradually evaporating the solution, and removing the crust of bitartrate, which forms on the surface, and which has given the name *cream of tartar* to the salt, (*Christison.*)

As met with in the shops, it has either the form of white crystalline crusts, which are gritty under the teeth, or, what is more common, of a fine white powder. It is devoid of smell, but has an acidulous and not disagreeable taste. It is soluble in 90 parts according to some—60 according to others—of cold water; and in about 15 of boiling water; and is insoluble in alcohol. It is liable to be adulterated by white mineral and other powders, and usually contains from 2 to 5 per cent. of tartrate of lime, which does not, however, interfere much with it in a medical point of view. When pure, it is wholly soluble in boiling water; and if impure, the extraneous matters remain undissolved. Should it be adulterated by either alum or bisulphate of potassa, the fraud will be detected by the chloride of barium, which throws down white sulphate of baryta, insoluble in nitric acid.

In small doses, bitartrate of potassa is a gentle laxative, and, associated with sulphur, is a common domestic remedy for preserving the health of children in spring and autumn. In larger doses, it acts more powerfully, and is often given along with jalap, senna, and other cathartics to exert a hydragogue effect. When prescribed as an aperient, it may be in the dose of a drachm or two; as a hydragogue cathartic, from half an ounce to an ounce: and as good a vehicle as any is molasses. When associated with sulphate of magnesia, its acidity masks the disagreeable taste of the latter; and a solution, formed of the two, makes an excellent aperient in habitual constipation. (See page 136.)

Bitartrate of potassa is employed in the preparation of the *antimonii et potassæ tartras*, the *ferri et potassæ tartras*, the *potassæ tartras*, the *pulvis jalapæ compositus*, and the *sodæ et potassæ tartras*, of the Pharmacopœia of the United States.

26. POTAS'SÆ SULPHAS.—SULPHATE OF POTASSA.

Sulphate of potassa,—of old, *sal pol'ychrest* or *salt of many virtues*,—is found in both kingdoms of nature, but that which is used as a medicine is prepared artificially. It is made on the large scale from the salt, which remains after the distillation of nitric acid from nitrate of potassa. This has an excess of sulphuric acid, which may be neutralized—as directed by the Dublin College,—by carbonate of potassa. The London College ignites the salt in a crucible, until the excess of sulphuric acid is entirely expelled; whilst the Edinburgh College neutralizes it with carbonate of lime. Both of these processes are more economical than that of the Dublin College.

As we meet with it, sulphate of potassa has usually the shape of single or double six-sided pyramids. The crystals are of a white colour, very hard and permanent in the air; devoid of smell, and of a bitter saline taste. They require sixteen times their weight of water at 60° to dissolve them, and five times their weight of boiling water; and are insoluble in alcohol.

Sulphate of potassa is a mild cathartic, operating without any unpleasant concomitants; but it is rarely employed. As a laxative, it might be given in the dose of 20 or 30 grains; as a purge, in doses of 4 or 5 drachms. It is sometimes, but not often, combined with rhubarb, in dyspeptic cases, and in gastro-intestinal affections of children, which are accompanied with constipation.

It enters into the composition of the *pulvis ipecacuanhæ compositus* or *Dover's powder*,—not on account of its medical virtues, but because—by reason of its hardness—it facilitates the division of the opium.

Bisulphate or *supersulphate of potassa*, POTAS'SÆ BISUL'PHAS, is officinal in the British Pharmacopœias. The London and Edinburgh Colleges direct it to be made, by adding sulphuric acid to a solution of the salt that remains after the distillation of nitric acid. It is a white salt; has a very acid taste and reaction, and is soluble in twice its weight of water at 60°.

Bisulphate of potassa may be given in the same cases as sulphate of magnesia, with excess of sulphuric acid. Like the sulphate of potassa it is laxative, and has the advantage of being more soluble; but cannot always be substituted for it. In cases of want of tone of the digestive organs, accompanied by diminished secretion of acid,—the acid acts beneficially as a tonic; and in cases of hemorrhage from the bowels, good may result from the local astringent influence of the acid on the vessels concerned, whilst the salt may carry off the blood that has been effused. It is not, however, much prescribed at the present day, and perhaps not at all on this side of the Atlantic.

27. POTAS'SÆ ACE'TAS.—ACETATE OF POTASSA.

This salt may be formed by the direct combination of acetic acid and carbonate of potassa; evaporating and crystallizing.

The acid unites with the potassa of the carbonate, and carbonic acid is disengaged.

As met with in the shops, it has a white, foliaceous, satiny appearance; is soapy to the feel, inodorous, and has a strong saline, warm, and rather acrid taste. It is extremely deliquescent, and therefore, requires to be excluded carefully from the air. At 60° Fahr. 100 parts dissolve in 102 of water. (*Pereira.*) It is very soluble likewise in alcohol. When pure, it is perfectly neutral, and does not change the colour of litmus or turmeric. It is rarely adulterated, and never perhaps so as to interfere with its medicinal use. The Pharmacopœias of London and the United States lay down certain tests of its purity; but the Edinburgh considers them unnecessary.

Acetate of potassa is a mild cathartic; but it has been more celebrated as a diuretic, whence its old name *sal diureticus.* Owing to its affecting both the intestines and kidneys, it has been prescribed as a cathartic and diuretic in dropsy. To produce the former effect, it should be given in the dose of ʒij to ʒiij.

28. SO'DII CHLO'RIDUM.—CHLORIDE OF SODIUM.

Muriate of soda or *common salt* is extensively met with in the inorganic kingdom, and in both plants and animals. Its source, however, as an article of commerce, is in the water of salt springs, and in that of the sea. It occurs, too, in mines in various parts of the world. In this country, the chief saline springs are in New York, and in Virginia; the salt works at Kenawha, in the latter State, being estimated to have yielded two millions of bushels of salt in the year 1835. (*Wood & Bache.*)

Salt, dug from the earth, is sold in the crude state, under the name of *rock salt.* It is purified by solution, and crystallization. From mineral waters, it is obtained by evaporation and crystallization. From sea-water, it is made in the same manner, the evaporation being either accomplished spontaneously, or by heat. Sea-water contains about 2.25 per cent. of it. The salt, which is obtained spontaneously, is the BAY SALT: it is in large grains. The ordinary salt is procured by artificial evaporation. It is in small white, irregular grains; and is the form in common use. BASKET SALT, is common salt dissolved and recrystallized, and is so called from being often sold in baskets. This and the bay salt are the best qualities.

The crystals of common salt are white cubes, and, when pure, they undergo no change in the air; as, however, it generally contains more or less chloride of magnesium, it is slightly deliquescent. At 60°, it requires about two and a half times its weight of water to dissolve it; and is scarcely more soluble in boiling water than in cold. It is sparingly soluble in rectified spirit, and scarcely at all so in absolute alcohol.

Chloride of sodium is rarely given as a cathartic, although in large doses it acts not only as such, but as an emetic. It probably aids the action of the other cathartics in mineral springs. It is a very common addition to cathartic enemata. As a cathartic, it operates in the dose of ℥ss to ℥ij. To clysters it is generally added in the quantity of a table-spoonful or two.

It is used in the preparation of the *Hydrargyri Chloridum mite* of the Pharmacopœia of the United States.

III. *Drastic Cathartics.*

29. JALA'PA.—JALAP.

Jalap root, the botanical origin of which was long uncertain, is now referred to *Ipomæ'a jala'pa*, or *Ipomæ'a purga;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Convolvulaceæ; a plant, which grows on the mountainous land around Chicanquiaco, not far from Xalapa or Jalapa, on the eastern slope of the Andes, at an elevation of about 6000 feet. Xalapa is the only market for the drug, whence it is exported through Vera Cruz. The entries of jalap into England for home consumption amounted at an average in 1831 and 1832, to 47,816 pounds a year. (*McCulloch.*)

Jalap root of commerce is in roundish or pyriform masses, rarely exceeding a pound in weight, and varying in size from that of the fist to that of a hat. The tubers are often, however, cut into pieces or sliced. They are of a dark brown colour, rough and wrinkled externally; heavy, hard, and pulverizable with difficulty, and—when broken—of a grayish colour, with concentric darker circles, in which the matter is denser and harder.

Jalap is liable to be worm-eaten, but it has been found, that the insect eats only the amylaceous portion, so that what remains is stronger, weight for weight, than that which has not been touched by it. The powder—in which state it is generally seen in the shops—is of a pale grayish brown colour, and a very disagreeable taste.

The active properties of jalap appear to reside in a resinous substance, which exists in the proportion of from 9 to 13.5 per cent.; hence water takes up from it chiefly amylaceous and mucilaginous extractive matter, and little of the cathartic principle, whilst alcohol dissolves the resin.

A LIGHT OF FUSIFORM JALAP, called, in Mexico, MALE JALAP, and said to be the produce of *Ipomæ'a Orizaben'sis*, is sometimes imported into this country, mixed with the true jalap; or alone, and sold for the latter. The genuine drug, may, however, be known by the characters above described: whenever it is light, of a whitish colour externally, of a dull fracture, and spongy or friable, it ought to be rejected. (*Wood & Bache.*)

Jalap is one of our most common and effective cathartics. It is said to have proved fatal by the violent inflammation it induced in the gastro-enteric mucous membrane, but the author has never met with such a case. It augments the secretion from the lining membrane of the bowels, and, at the same time, greatly increases the peristaltic action; to a less extent, however, than gamboge. Still, it is given in the same cases, alone or associated with other articles, where it is desirable to exert a considerable revellent and depletive agency on the intestinal canal, as in dropsy, encephalic affections, &c. Whenever, indeed, a brisk cathartic is needed, jalap fulfils the indication. It is apt, however, to excite nausea or tormina, and hence a corrigent, as ginger or some other excitant, is generally added to it; or another cathartic, which may modify its operation. Jalap, associated with mild chloride of mercury, is one of the most common cathartics. (*Jalap.* pulv. gr. xv; *Hydrarg. chlorid. mit.*; *Pulv. Zingib.* āā gr. v.—M.) The dose of powdered jalap is from fifteen to thirty grains. Its special affinity for the mucous membrane of the bowels is exhibited by the fact, that it purges, when applied to a wound. To children, it is sometimes given in cakes of gingerbread, the jalap being incorporated with the paste.

PULVIS JALA'PÆ COMPOS'ITUS, COMPOUND POWDER OF JALAP.—(*Jalap.* pulv. ℥j; *Potass. bitart.* pulv. ℥ij.) The dose of this powder—which is a common hydragogue cathartic prescribed in dropsy, and used whenever an active cathartic is demanded—is from ℈j. to ʒj.

TINCTU'RA JALA'PÆ, TINCTURE OF JALAP.—(*Jalap.* pulv. ℥viij; *Alcohol. dilut.* Oij. Prepared either by maceration or by the process of displacement.) This is not often prescribed alone. It is usually added to cathartic mixtures to quicken their operation. As a purgative, it will act in the dose of f. ʒij. to f. ℥ss.

EXTRAC'TUM JALA'PÆ, EXTRACT OF JALAP.—(*Jalap* in pulv. crass. ℔j; *Alcohol.* Oiv; *Aquæ*, q. s.—made into an extract by the process of displacement.) The extract may be given in doses of ten grains as a cathartic; but it is rarely used alone. It is an ingredient of the *Pilulæ catharticæ compositæ.*

Jalap-root is one of the bases of the *Tinctura Sennæ et jalapæ* of the Pharmacopœia of the United States.

30. COLOCYN'THIS.—COLOCYNTH.

The colocynth of the shops is the fruit of *Cucu'mis Colocyn'this,* or *bitter cucumber;* Sex. Syst. Monœcia Syngenesia; Nat. Ord. Cucurbitaceæ—deprived of its rind. It is a native of Japan, Coromandel, Cape of Good Hope, Syria, Nubia, Egypt, Turkey, and the Islands of the Grecian Archipelago, and is cultivated in Spain, whence it is imported, as well as from the Levant, Mogadore, &c.

The quantity, on which duty was paid in England, in the year 1839, was 10,417 lbs. (*Pereira*).

The fruit, commonly called *Coloquin'tida,* or *bitter apple,* is gathered in autumn, when it begins to assume a yellow colour, and is peeled and dried quickly either in the sun or in a stove. It is generally imported into this country peeled, but sometimes unpeeled—the Turkey colocynth of commerce being usually peeled—the Mogadore unpeeled. (*Pereira*).

The colocynth of the shops is in whitish balls of about the size of a small orange. These are very light and spongy; the seeds, which are inert, constituting three-fourths of their weight. The pith is the officinal portion. It has not much smell, but its taste is intensely and enduringly bitter and nauseous. It has been subjected to analysis, and found to contain a bitter or purgative principle—*Colocynthin* or *Colocynthite*—which is obtained by digesting the watery extract in alcohol, and evaporating the tincture thus formed. It is a bitter resinoid matter.

The pulp of colocynth is not readily pulverizable. It yields its virtues to water and to alcohol. It would seem, however, that cold water takes up only 16 per cent., whilst boiling water takes up 45 per cent.

Colocynth is a powerful irritant to the mucous membrane of the intestines, exciting, in large doses, fatal inflammation, and, as one of the results of its violence of action, occasioning, at times, abortion; hence it has been used to induce criminal abortion, which—like other agents—it never accomplishes except through the violence it does to the system of the mother. Even in small doses, when given alone, its operation is often very harsh, and hence it is usually combined with other articles of the class. It seems to exert its action on every part of the intestinal canal, and, unlike aloes, excites the organs of secretion of the mucous membrane to unwonted action, and thus becomes *hydragogue:* as such, it is not unfrequently prescribed in dropsy.

The dose of the powdered colocynth is from five to ten grains, intimately mixed with powdered gum arabic or starch; but it is rarely given in this state. The form of preparation, most commonly prescribed, is the following.

EXTRAC'TUM COLOCYN'THIDIS COMPOS'ITUM, COMPOUND EXTRACT OF COLOCYNTH. (*Colocynth.* ℥vj; *aloes,* pulv. ℥xij; *scammon.* pulv. ℥iv; *cardamom.* pulv. ℥j; *saponis,* ℥iij; *alcohol. dilut.* cong.) The aloes and scammony are added to modify the violent action of the colocynth; the cardamom corrects the griping tendency of the cathartics; and the soap is supposed to aid their solubility. It likewise adds to the consistency of the mass.

Compound extract of colocynth or *cathartic extract* is an excellent and powerful cathartic, forming, like aloes, the basis of many extemporaneous cathartic pills. It is very often associated with the mild chloride of mercury, and forms an excellent cathartic pill. (*Ext. Colocynth. comp.* ʒj; *hydrarg. chlorid. mit.* ℈j.—M. et divide in pil. xx. Dose, two or more, at bedtime.)

The ordinary dose of compound extract of colocynth as a cathartic is from five to thirty grains.

PIL'ULÆ CATHAR'TICÆ COMPOS'ITÆ, COMPOUND CATHARTIC PILLS. (*Ext. colocynth. comp.* pulv. ℥ss; *extract. jalap.* pulv.; *hydrarg. chlorid. mit.* āā ʒiij; *gambog.* pulv. ℈ij.—M.) This combination acts effectively in the dose of three pills. Forms for cathartic pills might, however, be multiplied almost indefinitely.

31. GAMBO'GIA.—GAMBOGE.

Gamboge or *Camboge*—although so well known as a pigment and a drug—is the concrete juice of a tree not yet ascertained. Two kinds of gamboge are described by writers, the *Siam* and the *Ceylon*, but it would seem, that the former only is known in commerce.

Although uncertainty hangs on the precise tree or trees that furnish the gamboge, it has been thought to be obtained from *Hebraden'dron Cambogioï'des, Cambo'gia Gutta* or *Stalagmi'tis Cambogioï'des,* Sex. Syst. Monœcia Monadelphia; Nat. Ord. Guttiferæ, a tree of moderate size, which is a native of Ceylon; and it is inferred, that in Siam it is procured from the same tree.

Three varieties of Siam Gamboge are met with in commerce;

1. the *pipe*, so called in consequence of its being in cylinders, often hollow; this is the purest; 2. the *lump* or *cake*, in masses of several pounds weight; containing generally fragments of wood, twigs, and air cells; and 3. the *coarse*, which differs from the other in containing more impurities.

Pure gamboge is devoid of smell, and has not much taste; but after it has remained some time in the mouth, an acrid sensation is experienced in the fauces. The colour of its fragments is orange yellow, but when the surface is rubbed with water, it becomes a bright yellow,—to produce which it is extensively employed as a pigment. It is brittle, and has a smooth glassy conchoidal fracture.

Gamboge has been carefully analysed by Dr. Christison, who found the composition of the pipe variety, according to two analyses of different samples, to be as follows:—Resin, 74.2,—71.6; arabin or soluble gum, 21.8,—24.0; moisture 4.8 in both instances: total—100.8,—100.4. It contained no trace of volatile oil.

The effect of gamboge on the economy is like that of elaterium, than which, however, it is much less active; and, like it, is used whenever a hydragogue cathartic is needed, as in dropsies, encephalic diseases, &c. It is rarely given alone, but is usually associated with other cathartics, which mutually temper each other's action. Owing to its tendency to induce nausea and vomiting, it should be prescribed in small doses,—from one to three or four grains, in the form of pill, repeated every four or five hours. It is one of the ingredients of the *Pilulæ Catharticæ Compositæ* of the Pharmacopœia of the United States. In large doses, it is an acrid poison, inducing violent inflammation of the lining membrane of the stomach and bowels; and the deaths which have followed the use of a celebrated nostrum, *Morrison's Pills*, have been ascribed to it. It has, indeed, been detected in them. (*Pereira.*)

32. SCAMMO'NIUM.—SCAMMONY.

Scammony is the concrete juice of the root of *Convol'vulus Scammo'nia;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Convolvulaceæ; a native of Greece and the Levant. It is obtained by cutting the root across near its crown, and sticking shells into it to catch the juice that exudes. The root is very large, generally three or four inches in diameter, and as many feet long; but a single root yields only a few drachms of scammony. The juice is milky as it exudes, and soon concretes under exposure to air and evaporation. (*Russel.*)

Scammony is usually exported from Smyrna; occasionally, it goes by way of Trieste, and, still more rarely, is shipped from Alexandria. The finest kind is called VIRGIN or LACHRYMA SCAMMONY; other varieties are termed *seconds* and *thirds*. Formerly, it would seem, the term ALEPPO SCAMMONY was applied to the finer, and that of SMYRNA SCAMMONY to the inferior kinds, but no such distinction is now known in British commerce. (*Christison*, and *Pereira*.) In 1839, the quantity of scammony on which duty was paid in England amounted to 8551 lbs. (*Pereira*.)

Scammony is said to be so generally adulterated that it is not easy to fix the characters of the genuine article. It is affirmed, indeed, that there is no article of the Materia Medica, which is sophisticated so often, or which it is so difficult to find pure, even in mere specimens for scientific examination. Dr. Christison remarks, that spurious scammonies are so very common, the pure drug so rare, and the characters of the two qualities so very different, that he has known well informed retail-druggists who could not tell what the pure article was.

The following have been laid down as the characters of good scammony by an accurate and practised observer. (*Pereira*.) It readily fractures between the fingers, or by the pressure of the nail; its specific gravity is about 1.2; its fracture dark, glistening, and resinous; the fractured surface should not effervesce on the addition of chlorohydric acid, which it would do if chalk were present; the decoction of the powder, filtered and cooled, is not rendered blue by tincture of iodine, which it would be if starch were present. One hundred grains, incinerated with nitrate of ammonia, yield about three grains of ashes; and sulphuric ether separates at least 78 per cent. of resin, (principally) dried at 280° F. Such, too, are mainly the tests of purity laid down in the last Edinburgh Pharmacopœia. The following tabular view of various spurious samples of scammony has been given. (*Christison*.)

	Calcareous.			Amylaceous.		Calc. Am.
Resin,	64.6	56.6	43.3	37.0	62.0	42.4
Gum,	6.8	5.0	8 2	9.0	7.2	7.8
Chalk,	17.6	25.0	31.6			18.6
Fecula,		1.9	4.0	20.0	10.4	13.2
Lignin and Sand,	5.2	7.1	7.8	22.2	13.4	9.4
Water,	6.4	5.2	6.4	12.0	7.5	10.4
Total,	100.6	100.8	101.3	100.2	100.5	101.8

Some concrete pieces, obtained from various species of convolvulus, and from certain species of the Apocynaceæ, are described by writers;—as the MONTPELIER SCAMMONY, from *Cynan'chum Monspel'iacum;* the BOURBON SCAMMONY from

Periplo'ca Mauritia'na; and the GERMANY SCAMMONY, from *Convol'vulus Se'pium;* but they do not appear to be known in the British or American markets.

Pure scammony is a gum-resin, containing, however, but a small proportion of gum. The analysis of two distinct specimens gave 81.8 and 83.0 per cent. of resin; 6.0 and 8.0 of gum; 1.0 and 0.0 of starch; 3.5 and 3.2 of fibre and sand; and 7.7 and 7.2 of water. (*Christison.*) When pure, it is almost wholly soluble in boiling dilute alcohol; and sulphuric ether takes up at least 77 per cent., and even 82 or 83 per cent., if the specimen be tolerably dry. The resin is the cathartic principle, and is separated in the form of the *Resina* seu *Extractum Scammonii* of the Edinburgh Pharmacopœia.

Scammony is a drastic cathartic, and applicable to all cases in which medicines of the class are needed. It is so liable to adulteration, however, and so uncertain, withal, in its operation, sometimes acting with great harshness, that it is not much used in this country, and when it is so, it is usually in combination with other cathartics, whose action it augments, whilst its own is mitigated. It is an expensive article, costing in England thirty-two shillings, or about seven dollars per pound, wholesale.

The ordinary dose of the scammony of the shops is from five to twenty grains. It is occasionally prescribed to children in combination with mild chloride of mercury, and an aromatic excitant to obviate its griping tendency. (*Scammon.* pulv. gr. iv; *Hydrarg. chlorid. mit.* gr. ij; *Zingib.* pulv. gr. iij. M.) It may be made into an emulsion with milk, which diminishes its excitant and irritating qualities.

Scammony enters into the composition of the *Extractum colocynthidis compositum,* and the *Pilulæ catharticæ compositæ* of the Pharmacopœia of the United States.

33. O'LEUM TIG'LII.—CROTON OIL.

Croton oil is the expressed oil of the seeds of *Croton Tig'lium,* or *Purging Croton:* SEX. SYST. Monœcia Monadelphia: NAT. ORD. Euphorbiaceæ, a native of the continent of India, of the islands forming the Indian Archipelago, and Ceylon. The seeds, formerly called *Grana tig'lii, G. til'ii, G. Moluc'cæ,* &c. are in size and shape similar to those of the castor oil plant. The shell is covered with a yellowish epidermis, beneath which the surface is dark brown or blackish. The kernel is of a yellowish-brown colour, and forms about 64 per cent. of the seed. The seeds are imported with the view of obtaining the oil from them, of which they yield about 50 per cent. under strong pressure. They have been repeatedly subjected to analysis, but no important pharmaceutical information has accrued from it.

The oil is obtained from the seeds in the same manner as the Oleum Ricini from the seeds of Ricinus Communis. It would seem, likewise, to be obtained from the seeds of *Croton Pava'na*, a native of Ava; and Dr. Burrough, who was for some time in India, informed Dr. Wood, that much of the oil, prepared there for exportation, is derived from the seeds of a plant entirely different from croton tiglium. A parcel of these seeds was planted by Dr. R. E. Griffith, who succeeded in raising a plant, which proved to be *Ja'tropha Curcas*, the seeds of which are known by the name of *Barbadoes Nuts*. This oil is weaker than the real croton oil, but is said by Dr. Burrough to be an efficient cathartic in the dose of three or four drops. (*Wood & Bache.*)

Croton oil is a thickish fluid, of a honey-yellow colour, disagreeable smell, and very acrid taste, exciting inflammation of the tongue and fauces. It has a very acrid matter associated with it, possessing acid qualities—the *crotonic acid*—which is identical with the jatrophic. In ether and turpentine, it is wholly soluble; in alcohol partially so.

It is occasionally adulterated with castor oil, which may be detected by treating it with absolute alcohol, which dissolves the castor oil, and thus lessens the volume of the oil, whilst no perceptible effect is produced on pure croton oil.

Croton Seeds, like the seeds of the castor oil plant, are highly acrid and cathartic. In India, they are prepared for medical use by being slightly torrefied, by which the shell is more readily separable, and the activity of the acrid property thought to be diminished. Even then the kernel acts powerfully as a cathartic in the dose of one or two grains.

Croton Oil is a drastic cathartic, and very valuable in one respect—that it can be given in small doses. In many cases of great torpor of the intestines, its action has proved very certain. Even a drop commonly produces eight or ten fluid evacuations; but at times it has been necessary to give as many as four or five drops in the course of ten or twelve hours. Like most of the drastic cathartics, it occasions tormina, but these are less distressing than the burning sensation, which it commonly causes in the fauces. Not unfrequently, also, it induces nausea and vomiting. It is one of the most speedy cathartics in its operation; and, being active in a small dose, it is adapted for cases in which deglutition is effected with difficulty or is impracticable, as in apoplexy, paralysis, &c., in which cases it may be dropped on the tongue. It may likewise be employed when a revellent action on the bowels is needed, or in obstinate constipation where other remedies have failed.

The ordinary dose is stated to be one or two drops; but it will generally operate in smaller quantity than this, even in one-fourth or one-half a drop, repeated every hour or two. It is usually given in the form of pill. (*Olei tiglii*, gtt. iv; *Micæ panis* q. s. ut ft. pil. viij. Dose, one, two, or more.) It has also been given in the form of *emulsion*, the objection to which is the acrid sensation it induces in the throat. Hufeland recommended it as a substitute for castor oil, advising that a drop of it should be added to an ounce of oil of poppies, and that the mixture should be called *O'leum Ric''ini officina'lē.*

A *soap of Croton oil*, composed of two parts of the oil to one part of liquor potassæ, has been recommended, of which two or three grains prove cathartic.

A *Tincture of the seeds* has likewise been proposed, formed of two ounces of the seeds from which the rinds have been removed, and one ounce of alcohol. This acts as a cathartic in the dose of 20 drops.

Croton oil—as will be seen under another head—is likewise a valuable counter-irritant; and it is affirmed, that a few drops, applied externally by way of friction around the umbilicus, have exerted a cathartic effect. In obstinate cases, or where the stomach will not readily receive this or other purgatives, it may be tried in this manner.

In another work, the author has given various forms for administering the croton oil, many of which, however, are employed by individuals rather than by the mass of the profession. (See *New Remedies*, 3d edit. p. 372–374. Philad. 1841.)

34. O'LEUM EUPHOR'BIÆ LATHYR'IDIS.—OIL OF CAPER SPURGE.

The *Euphor'bia Lath'yris, Garden Spurge, Caper Spurge, Caper plant* or *Mole plant;* Sex. Syst.; Dodecandria Trigynia; Nat. Ord. Euphorbiaceæ, is indigenous in France. Although not a native of this country, it is sometimes met with in situations where it has the appearance of growing wild. It is easily cultivated, and in some parts of New Jersey is found in abundance. The oil is obtained from the seeds in the same manner as castor oil from the castor oil seeds. It resembles, in colour, the Oleum Ricini, but is less dense. It has no odour when newly prepared, and no perceptible taste; but it speedily becomes rancid and acquires great acrimony. It is soluble in sulphuric ether; insoluble in alcohol, and forms a soap with alkalies.

About forty or forty-four parts of oil are obtained by expression from one hundred parts of the seeds.

The oil, prepared in Europe, acts as a cathartic in the dose of from four to eight drops, without occasioning tormina or tenesmus, but that obtained from beans raised in this country is not as mild an article. Even when administered with aromatic oils, and made into a soap with alkalies, it produced, in numerous instances, nausea and vomiting. It would seem, however, that when given in small quantities, and repeated at intervals of half an hour or an hour, it operates freely as a cathartic without inducing much nausea.

It may be given in the form of pill with crumb of bread, or made into an emulsion with mucilage of gum arabic, sugar and water. (See the author's *New Remedies*, 3d edit. p. 210.—Philadelphia, 1841.)

36. ELATE'RIUM.

Elaterium is a substance deposited by the juice of the fruit of *Momor'dica Elate'rium, wild* or *squirting Cucumber;* Sex. Syst. Monœcia Syngenesia; Nat. Ord. Cucurbitaceæ, a native of the South of Europe, and common on rubbish in the villages of Greece, and the Archipelago. It is cultivated in Great Britain for medical use.

It was found by Dr. Clutterbuck, that the seat of elaterium is entirely in the juice around the seeds, obtained without expression. When the cucumber is sliced and placed upon a sieve, a colourless juice flows out, which soon becomes turbid, and in a few hours deposites a sediment. This is the true elaterium, which Dr. Clutterbuck found to purge in the dose of one-eighth of a grain. The quantity, however, obtained in this way, is very small, not more than six grains having been got from forty cucumbers. The process recommended in the British Pharmacopœias is to slice ripe wild cucumbers and strain the juice, very gently expressed, through a very fine hair-sieve, it is then set by for some hours, until the thicker part has subsided. The thinner supernatant part being rejected, the thicker is dried with a gentle heat. It would appear, however, that the process, actually followed at Apothecaries' Hall, London, is the following:—The fruits are cut longitudinally in halves by women, and are then placed in a hempen cloth, and put into a screw-press; apparently, a tolerable pressure, is applied but for a few minutes only, being removed before all the juice has ceased to run out. When the fruits are taken out of the press, they are but very slightly crushed, so that the pressure cannot have been great. The juice—as it runs from the press—falls into a hair-sieve, through which it flows into a cylindrical-lipped glass jar. Here it is allowed to remain for about two hours, in which time a greenish fecula is deposited. The supernatant liquor is then carefully poured off, and the thicker liquid at the bottom is placed on a paper filter supported by a cloth one, stretched on a wooden frame: a bitter, yellowish brown liquor runs through, and a green mass is left on the filter. The latter is then carefully dried by a stove, and constitutes the *finest elaterium*. The mother liquid, which was poured off from the deposit, is placed in shallow brown pans, and there lets fall a fresh deposit, which, when separated and dried, forms a *paler elaterium*.

Elaterium of commerce appears to consist essentially of the active matter, to which the name *elaterin* has been given, with the green colouring matter, cellular tissue, and starch expressed from the fruit, and mixed with the residue obtained by drying the bitter liquor, with which the tissues and elaterin were moistened. (*Pereira.*) It is in light, thin, friable cakes or segments, which bear frequently the marks of the muslin or paper on which they were dried. The colour is of a pale greenish gray, which becomes yellowish by exposure. Its taste is acrid and bitter.

Some inferior kinds are met with, which are much curled, gummy, and of a brown, or olive green colour. They are supposed to be prepared from the juice after the finest elaterium has been separated. (*Pereira.*)

A variety of elaterium is imported into England from Malta, which is in much larger flakes than the best English elaterium, and has frequently some paper adherent to it on which it was dried. It is not seen, so far as the author knows, in this country.

So active a substance, and one so liable to variation in strength, not so much from adulteration as from errors in the time of collecting or mode of preparation, has necessarily attracted to it the attention of the chemical analyst. Dr. Paris found 100 parts to contain 26 per cent. of extractive; 28 of starch; 5 of gluten; 25 of woody matter; 4 of water, and 12 of a green, resinoid and bitter matter, to which he gave the name *Elatin;* and as he ascertained, that it possessed all the properties of the elaterium, he considered it to be the active principle. Since then, however, this elatin has been shown to consist of chlorophylle or green colouring matter, with a colourless crystallizable substance, to which the name *Elaterin* has been given.

The following table, from Pereira, exhibits the different strength of various specimens of elaterium:

100 *parts of Elaterium.*	*Quantity of Elaterin.*
Prepared according to the London College, (*Hennell,*) - - - - -	44
Best British Elaterium, (*Morries,*) -	26
Worst do., (*Morries,*) - - - - -	15
French Elaterium, (*Morries,*) - -	5 or 6

Elaterium, (*Edinburgh Pharmacopœia,*) -	14. 3 to 25
Best specimens, (*Balmer,*) - -	33
Fine sample, prepared at Apothecaries' Hall in 1839, and dried by steam heat, (*Pereira,*)	26

Elaterium, in an over-dose, is a violent acrid poison, producing inflammation of the lining membrane of the stomach and bowels. In smaller doses, it is a drastic cathartic, causing a copious secretion from the follicles and exhalents of the intestines, and being the most active of the hydragogue cathartics. On this account it is employed in dropsy; and, where there has been no important lesion of the abdominal viscera, its revellent and depletive influence, exerted in this manner, has succeeded in cases of active dropsy, after other remedies had failed. By its revellent action, it is likewise well adapted for encephalic affections, such as apoplexy, mania, &c., in which there is usually great torpor of the intestines.

On account of the uncertainty of the strength of commercial elaterium, and the occasional harshness of its operation, it is not much employed, and when it is, it should be given in divided doses, and be repeated until it operates. Half a grain, united with three grains of the extract of gentian as a constituent, may be given every hour or two, until it operates. Even in this quantity, it may excite nausea and vomiting. Not unfrequently, it acts on the bowels in the dose of one-eighth and even of one-sixteenth of a grain. The ordinary dose of good elaterium may, indeed, be so stated, yet we rarely meet with it of such a strength. Dr. Pereira affirms, that he has repeatedly employed, and seen others employ, elaterium, and has always observed, that a quarter of a grain of good elaterium acted very powerfully, sometimes bringing away several pints of fluid; and that half a grain usually occasioned vomiting as well as violent purging.

As the active part of elaterium, the *elaterin,* is soluble in rectified spirit, it has been proposed to administer it in the form of tincture, made of one grain of *elaterin,* a fluid ounce of *alcohol,* and four drops of *nitric acid.* Between thirty and forty minims seldom fail to act freely.

The dose of the elaterium of Clutterbuck is always fixed at one-eighth of a grain; that of the elaterin at one-sixteenth to one-twelfth of a grain.

Some other indigenous articles that act as cathartics have been admitted into the secondary list of the Pharmacopœia of the United States; for example:

36. APOC''YNUM CANNAB'INUM, *Indian Hemp:* SEX. SYST. Pentandria Digynia; NAT. ORD. Apocynaceæ: the root of which

is officinal, and which is powerfully emetic and cathartic. It has been used as a hydragogue cathartic in dropsy. From fifteen to thirty grains of the powdered root generally induce vomiting. It is most commonly given in decoction. (*Apocyn. cannab.* ℥iss; *Aquæ*, Oiss; coque ad. Oj.—Dose, f. ℥j. to ℥ij.)

37. Convol'vulus pandura'tus, *Wild potatoe*, Sex. Syst. Pentandria Monogynia; Nat. Ord. Convolvulaceæ, which grows in every part of the United States, flowering from June to August. The root, which is the officinal portion, has been proposed as a substitute for jalap in the dose of forty grains; but it is rarely employed.

38. Iris versi'color, *Blue flag*: Sex. Syst. Triandria Monogynia; Nat. Ord. Iridaceæ; found in all parts of the United States, flowering in June; the root of which—the officinal portion—has been used as a cathartic; but it is apt to be followed by distressing nausea and prostration. The dose is from twenty to thirty grains, but it is scarcely ever employed.

39. Trios'teum, *Fever-root*. This is the root of *Trios'teum perfolia'tum; Fever root*, *Feverwort* or *Wild Ipecac.;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Caprifoliaceæ; which is found in most parts of the United States; flowering in June. The root is cathartic; and in large doses emetic. The dose of the bark of the root—the part usually employed—is twenty or thirty grains; alone or combined with other cathartics, as calomel.

III. ANTHELMINTICS.

Synon. *Antihelmintica, Antiscolica, Antiverminosa, Vermifuges.*

Definition of anthelmintics—Experiments on worms, out of the body—Different kinds of anthelmintics—True anthelmintics—Mechanical anthelmintics—Anthelmintics that expel worms by acting on the intestinal canal—Anthelmintics that prevent the formation of worms—Ectozoa—Particular anthelmintics

This class of medicinal agents ought to embrace not only medicines, which prevent the generation of entozoa within the body, but such as destroy or expel them, when already existing there.

The common definition of anthelmintics is—"remedies which destroy or expel worms situate in any part of the alimentary canal." Murray and Paris restrict it to 'remedies, which expel worms;'—but this is an unimportant part of their operation. The great object is to get rid of the predisposition to their generation. The anthelmintics, that destroy or expel, merely remove the parasites already present in the alimentary tube; but, unless the pathological condition that gives occasion to their reproduction be removed, the evil will constantly recur.

Whilst this pathological condition was disregarded, attempts were altogether restricted to the discovery of such agents as appeared to be detrimental to entozoic existence, or of such as might most effectually dislodge the parasites; and the number, brought forward with such pretensions, has been prodigious; yet but few are employed at the present day, and this partly—indeed chiefly—because the main object of the practitioner, is properly considered to be to prevent their fresh generation.

Numerous experiments have been instituted on worms, that have been voided,—under an expectation, that some light might, in this way, be thrown on the agents that would probably be most detrimental to them whilst in the body. Redi undertook several experiments on the ascarides lumbricoïdes, of which the following is a partial summary:—in *cold water*, they lived from sixty to seventy hours; in an *infusion of coralline*, more than sixty hours; more than thirty in water rendered bitter by *aloes*. In water, saturated with *salt*, they died speedily; in *brandy*, still more speedily; in *syrup*—and the experiment was often repeated —within three or four hours. In *wine*, one lived twenty-four, another forty, and a third seventy-four hours.

It has been a question, whether the fatty oils be noxious to worms. They who believe, that, like insects, they are furnished with spiracula, have thought, that, by pouring *oil* upon, or anointing them, the spiracula would become obstructed, and hence the animal would die. Human entozoa are not, however, furnished with spiracula, nor do experiments prove the noxious agency of oils. Coulet affirms, that he found the tænia solium live as long in *oil of almonds* as in any other fluid. Arnemann, found, that human ascarides lumbricoïdes, as well as those of the swine, lived several days in *oil*, when kept in a warm situation. They were in all cases, however, affected with restlessness and contortions; but their bodies became gradually languid and lax: their movements were executed with difficulty, and, as it appeared, painfully, and the skin was contracted into rugæ. In *oil of sweet almonds*, a lumbricus of the hog lived twenty-seven hours; another, thirty; human lumbrici, from forty-six to fifty-three. In *oil of bitter almonds*, the lumbrici of the hog lived eighteen, twenty-four, and thirty-nine hours; whilst the human, died within thirty-four. In *castor oil*, those of the hog lived fifty-six; the human, from forty-four to forty-eight; the distoma hepaticum, eight: in *linseed oil*, those of the swine from eighteen to twenty; the human from twenty-three to twenty-six. In *oil of walnuts*, those of the swine, twenty-two; the human, twenty to twenty-five. In *oil of the hazelnut*, those of the hog, nineteen; the human, twenty-six. In *oil of poppy*, those of the hog, twenty; the human, seventeen, twenty-two, and twenty-seven. In *oil of elder*, those of the hog, twenty-eight; the human, two and three. In *oil of hyoscyamus*, those of the hog, eighteen and twenty-two; the human, twenty-seven. In *oil of beech*, those of the hog from twenty-nine to thirty-two; the human, forty to forty-six. In *oil of hemp*, those of the hog, sixteen and twenty-three; the human, twenty-seven. In *oil of mustard*, both those of the hog, and man, thirty-six. In *rape oil*, those of the hog, twenty-one to twenty-six; the human, twenty-eight; and in *oil of behen* the human lived twenty-six hours.

None of these experiments, however, were as satisfactory as those instituted by Chabert with his *empyreumatic oil*, which consists of one part of the fetid or *empyreumatic oil of hartshorn*, and three of the *essential oil of turpentine*, subjected to distillation. Every kind of worm, immersed in it, was killed either immediately, or after the lapse of a few minutes. The preparations of turpentine, are, indeed, amongst the most detrimental to entozoic existence of the substances with which we are acquainted.

Anthelmintics, according to the definition generally given of them at the present day, may be divided into four classes.

First,—True anthelmintics. *Secondly*,—Mechanical anthelmintics. *Thirdly*,—Anthelmintics, that expel worms by acting on the intestinal canal. *Fourthly*,—Anthelmintics, that prevent their formation.

1. *True Anthelmintics.*

Of those anthelmintics, that prove destructive to entozoic life by virtue of some principle, poisonous to them, which they contain, there are but few employed in ordinary practice; yet the lists of the materia medica supply us with a host of such remedies. The preparations of turpentine, especially the oil, united, or not, with the empyreumatic animal oil obtained during the distillation of hartsorn, are decidedly the best; but the improvident employment of these and other excitant agents, is liable to induce that debility of the digestive function and of the system, which is the great predisponent of worms.

If the proper administration of these remedies fails to destroy the parasites, little dependence can be placed upon the others.

It is singular, that M. H. Cloquet should put the *aqueous decoction of hydrargyrum purificatum* at the head of his list of anthelmintics. He observes, also, that he has seen the ascarides lumbricoïdes evacuated in a state of torpor, after the abdomen of the patient had been rubbed with a mixture of *ox's gall*, and *common soap*, with *oil of tansy*, or *oil of chamomile*, strongly impregnated with *camphor*, and *garlic;* or with *milk*, holding *aloes* in solution, impregnated with the bitter principle of the *colocynth*, and *camphor;* or with a maceratum of *bruised garlic* in *camphorated sulphuric ether*. A like effect, he says, is produced by a *plaster* composed of *yellow wax*, *litharge*, *assafetida*, and *galbanum*. He also recommends an application, which is neither the most elegant, nor readily attainable;—*assafetida* dissolved in the *gastric juice!* "or, what is more simple, in the *saliva.*" Other external applications have been recommended by Laënnec, Barton, &c.: their action, however, may, in all cases, be explained in one of two ways. The terebinthinate, alliaceous, or highly odorous agents, may be absorbed into the system, and, in this way, come in contact with the entozoa, but it is not probable, that they can affect them, in a state of sufficient concentration, to be detrimental. This explanation will not, however, apply to others. There is every reason for believing, that frictions, cataplasms &c., act as indirect anthelmintics only, by improving the activity of the gastric and intestinal operations, and thus removing the grand predisposition.

2. *Mechanical Anthelmintics.*

Of these, two only are now in general use. In the United States, indeed, neither of these is much employed, but in Great Britain they have by no means outlived favour. These two are the *filings of tin* or *granular tin*, and *mucuna* or *cowhage*. The mode in which they act is described hereafter.

3. *Anthelmintics that expel worms by acting on the intestinal canal.*

The substances that operate in this manner belong to the class of cathartics; but these should not be of a violent character, or often repeated, owing to the debility they are likely to induce in the digestive organs. The occasional exhibition of a brisk cathartic is often a valuable agency in not only removing the worms, but in stimulating the gastric function to a more healthy action, and thus removing the predisposition. By exciting, too, the intestines to throw off the retained fæces, and secretions,—in which the worms are often enveloped, and find a nidus favourable for their generation,—they enable those anthelmintics, which may be prescribed, to come more immediately into contact with the parasites, and should, consequently, be made to precede the use of those remedies. Nor is it alone prior to the administration of anthelmintics that cathartics are useful. When the former have been prescribed for a few days, and there is reason to hope that they have occasioned the death of the worms, a brisk cathartic may be advantageously given for the purpose of removing any accumulation of dead animal matter that may have taken place, and thus of diminishing the tendency to a fresh generation. The cathartics that have been chiefly used for this purpose, are the *oleum ricini*, *oleum tiglii*, *gamboge*, *scammony*, *jalap*, *aloes*, and *calomel*,—singly or combined.

4. *Anthelmintics that prevent the formation of worms.*

This class of agents is, after all, the most important. The great predisposition to invermination consists in want of tone generally, and in the gastro-enteric organs especially. Accordingly, agents that are found to aid chylosis, prove most valuable. Charcoal has long had a character for being anthelmintic, and it is well known, that it has been, and is, constantly mixed with the food employed for fattening fowls for the markets of large towns. The charcoal contains no soluble matter, but, by grating over the mucous membrane of the stomach and intestines, it stimulates the organs, concerned in digestion, to greater activity, and enables a larger quantity of chyle to be separated from the food, taken along with it, than could be accomplished without its agency.

Such is the fact, likewise, with regard to salt—the *condiment of condiments*, as it has been, not improperly, termed. Where children are not allowed a proper quantity with their meals, they have been observed to be extremely liable to the generation of these parasites; and therefore a due allowance is always to be permitted, and recommended. The agriculturist administers it liberally, for the prevention of invermination in his cattle; and it is occasionally given to both animals and man as a true anthelmintic. Fortunately, it is much liked by children, who have apparently a natural taste for it, as is the case with the individuals of the animal kingdom,—the buffalo of our own country daily frequenting the *salt licks* of the west to enjoy the treat; and all our domestic cattle lick it with the greatest delight.

In the twenty-ninth volume of the *London Medical and Physical Journal*, Mr. Marshall has published the case of a lady, who had a natural antipathy to salt—which is rare—and who was dreadfully infested with worms during the whole of her life. In Ireland, according to Dr. Paris, where, from the bad quality of the food, the lower classes are very subject to worms, a draught of salt and water is a popular and efficacious anthelmintic, and Lord Somerville, in his address to the English Board of Agriculture, refers to the effects of a punishment, which formerly existed in Holland. "The ancient laws of the country," says his lordship, "ordained men to be kept on bread alone, UNMIXED WITH

SALT, as the severest punishment that could be inflicted upon them in their moist climate. The effect was horrible; these wretched criminals are said to have been devoured by worms engendered in their own stomachs." (See the author's *Elements of Hygiène*, p. 310: Philad. 1835.)

Where the practitioner is desirous to destroy worms, the management may have to be somewhat modified by the particular variety; but, as the symptoms, which distinguish these from each other, are by no means unequivocal, the treatment must be obscure also. This is, however, of the less consequence, as all entozoa are induced by the same causes, and more or less affected by the same vermifuges. As the ascarides or oxyures vermiculares occupy the lower part of the bowels, and occasion a troublesome itching within the rectum, their presence may be suspected, and medicines can be introduced to act upon them immediately, by the way of injection; aided, or not, by anthelmintics administered by the mouth. In all cases, perhaps, it would be better, that they should be placed, in this way, between two fires, as it were, as they have been found even in the upper part of the alimentary tube, whence they have been ejected by vomiting; and it is not by any means improbable, that the annoyance, occasioned by a clyster, might induce them to migrate, for the purpose of seeking quiet in the higher portions of the intestines, or at least of getting rid of the irritation to which they may have been exposed in the lower portion. In all cases it will be necessary to investigate the condition of the system, that favours the unusual generation of worms, and to treat it accordingly; but the consideration of this subject belongs more particularly to Special Therapeutics. (See the author's *Practice of Medicine*, i. 193: Philad. 1842.)

SPECIAL ANTHELMINTICS.

I. *True Anthelmintics.*

1. OLEUM TEREBINTHINÆ.—OIL OF TURPENTINE.

Oil of turpentine—whose general properties are described elsewhere—singly, or combined with other agents, is the most powerful of the direct anthelmintics, destroying worms rapidly which may be immersed in it out of the body. It is likewise—as elsewhere shown—a cathartic, so that it is rarely necessary to administer any other cathartic afterwards, as is the case with many of the anthelmintics. Should it not act on the bowels, however, it may be advisable either to associate with it castor oil, or to follow it up in the course of a few hours by a dose of this oil, inasmuch as when it does not pass off, it may, by being absorbed, give rise to encephalic mischief, (*Copland*,) and occasionally to nephritic symptoms. It is applicable to every variety of intestinal worms, and has proved very efficacious in cases of tænia.

It may be given in the dose of f. ʒij to f. ℥ss, and more, in molasses; or made into an emulsion with the yolk of egg or mucilage—(*Ol. terebinth.* ℥ss; *vitell. ovi*, seu *mucilag. acac.* ʒvj; *Aquæ menthæ piperit.* ℥ss—M.) Dr. Pereira states, that he has frequently administered f. ℥iss, and sometimes f. ℥ij, and in no instance has he seen any ill effects from it.

In cases of the oxyures or ascarides vermiculares, oil of turpentine may be made to come in contact with them in the form of enema.

2. O'LEUM ANIMA'LĒ.—ANIMAL OIL.

Animal oil, or *Dippel's oil—O'leum anima'lē Dippel'ii*—is obtained by subjecting animal substances—as bone—to destructive distillation. The commercial article is derived from the manufacture of bone black, and is identical with the *Oleum cornu cervi* or *Oil of hartshorn* of the older Pharmacopœias. It is thick, brown, viscid, and has a most disgusting odour.

This oil has been highly extolled as an anthelmintic—by the Germans more especially, and it is, unquestionably, very effective even in cases of tænia; but it is so inexpressibly nauseous, that but few stomachs can retain it. Its virtues have been ascribed to the creasote which it contains, and they are, doubtless, dependent in part upon that constituent. The dose is ♏v. to ♏xx. in molasses, given for three mornings in succession, and followed by a cathartic.

The Empyreumatic Oil of Chabert, made—as before remarked—by adding one part of *animal oil* to three parts of *oil of turpentine*, leaving them to combine for four days, and then distilling three parts, has been greatly extolled. It, also, is very nauseous. It combines the anthelmintic virtues of its constituents, and may be given in the dose of a tea-spoonful three times a day. It is a very effective vermifuge.

3. CHENOPO'DIUM.—WORMSEED.

The wormseed of the United States is the fruit of *Chenopo'dium Anthelmin'ticum* or *Jerusalem Oak:* Sex. Syst. Pentandria

Digynia: Nat. Ord. Chenopodiaceæ,—the wormseed of Europe being the fruit of *Artemis'ia Santon'ica*, (Dublin College,) or of a variety of the *A. Marit'ima.* (*Pereira.*) Dr. Pereira, however, affirms, that the substance, sold in Great Britain under the name of wormseed, does not consist of seeds, but of broken peduncles, mixed with the calyx and flowerbuds.

Chenopodium anthelminticum is an indigenous plant, which grows in almost every part of the United States, but especially to the south,—being found in the vicinity of rubbish, along fences; flowering from July to September, the seeds ripening in autumn. These are small, roundish, light, of a very bitter peculiar taste, and of a disagreeable odour, which is possessed by the whole plant. Their properties are dependent upon a volatile oil separable by distillation with water.

The seed of the chenopodium is one of the most popular anthelmintics in use in the United States; and the common mode of prescribing it to a child three or four years old is to mix one or two scruples of the powder with molasses; administering this for three nights in succession, and then prescribing a cathartic on the following morning.

O'LEUM CHENOPO'DII or *oil of wormseed*, *wormseed oil*, is officinal in the Pharmacopœia of the United States. It is of a bright-yellow colour when freshly distilled, but becomes darker by age. It is administered in the same manner as the powder, in the dose of four to eight drops. It may be mixed with sugar or molasses.

4. SPIGE'LIA.—PINKROOT.

Spigelia is the root of *Spige'lia Marilan'dica*, *Indian Pink*, *Carolina Pink* or *Perennial Wormgrass:* Sex. Syst. Pentandria Monogynia: Nat. Ord. Gentianaceæ;—Spigeliaceæ, (*Martius*,) an indigenous plant of the States south of the Potomac, which grows in rich soils on the edges of woods, and flowers from May to July. It is collected in quantities by the Creeks and Cherokees, by whom it is packed in casks, or, more frequently, in large bales, weighing from 300 to 350 lbs.;—that in the casks being preferred as less likely to be damp and mouldy. (*Wood & Bache.*)

The dried root, as met with in the shops, consists of numerous, slender, branching crooked and wrinkled fibres, issuing from a short rhizoma. These fibres are from three to six inches long. Its odour is faint; and taste sweetish and slightly bitter. Its activity has been assigned by Feneulle to a brown bitter extractive, similar to that of the cathartic Leguminosæ, which, when taken internally, causes vertigo and a kind of intoxication. The virtues of spigelia are imparted to boiling water.

The roots are sometimes mixed with those of a small creeping plant, which twines round the stem. These are much smaller and lighter coloured, and should be separated before the spigelia is dried. (*Wood & Bache.*)

Pinkroot is much used in the United States as an anthelmintic, and although cases are related in which it is said to have proved acro-narcotic, and even to have caused death, it is very extensively prescribed, and with entire impunity. Still, it is well to bear in mind, that such cases have been recorded, as well as the statement, that the acro-narcotic effects are less apt to occur when the medicine acts on the bowels, or is combined with cathartics. Dr. Wood affirms, that, in the United States, it stands at the head of the anthelmintics. It certainly is highly esteemed by many, but others have equal confidence in the chenopodium, and much more in the oil of turpentine and its combinations. It is scarcely used in Great Britain, although it is officinal in the Pharmacopœias of London, Edinburgh and Dublin.

The dose of the powdered root, for a child a few years old, is from ten to twenty grains, and for an adult from one to two drachms. This may be given every night, or every night and morning, for three successive days, and then be followed by a brisk cathartic. Or it may be associated with calomel, jalap, or any of the cathartic powders.

INFU'SUM SPIGE'LIÆ, INFUSION OF PINK-ROOT. (*Spigel.* ℥ss; *Aquæ bullient.* Oj.) The dose of this infusion, for a child a few years old, is, f. ℥ss, to f. ℥i; for an adult, f. ℥iv, to f. ℥viii, given in the same manner as directed for the powdered root, or an equal quantity of senna may be added to the infusion. A preparation is generally kept in the shops, which is said to be much prescribed by physicians under the name of *worm-tea*, and which consists of pink-root, senna, manna and savine, mixed together in various proportions to suit the views of the prescriber. (*Wood & Bache.*) The author has never used it, nor seen it used.

5. FILIX MAS.—MALE FERN.

Filix Mas, of the secondary list of the Pharmacopœia of the United States, is the rhizoma of *Aspidium Filix Mas* or *Nephro'dium Filix Mas;* Sex. Syst. Cryptogamia Filices; Nat. Ord. Filices; a plant which is indigenous in this country in shady pine forests, from New Jersey to Virginia, as well as in those of Europe, Asia, and Africa. The rhizoma should be collected in the months of July, August, or September. The sound parts are to be carefully dried and reduced to powder. When dried, its odour is weak, taste sweet, and mucilaginous, slightly bitter and austere. It is generally brought to this country from Europe.

As met with in the shops, it consists of fragments of the dried thickened bases of the footstalks, to which small portions of the rhizoma are found adhering, and of the root fibres. It is recommended, that the stock of the apothecary should be renewed annually, as in two years the best article becomes useless.

Filix mas has been analyzed by various individuals, and it is probable, that the anthelmintic virtues reside in volatile oil, which exists in it to the amount of about 7 per cent. It contains, likewise, tannic and gallic acids, which communicate to it its astringent properties.

The root of the male fern has only been used as an anthelmintic. It was the basis of Madame Nouffer's celebrated remedy for tænia, which was purchased by Louis XVI, in 1775, for 18,000 francs.

The dose of the powdered root is one to three drachms, given in molasses for three nights in succesion, and followed by a brisk cathartic in the morning. The plan adopted—and successfully, in many cases,—by Madame Nouffer, was to give two or three drachms of the powder in from four to six ounces of water, in the morning fasting, and, two hours afterwards, a purgative bolus composed of ten grains of *calomel*, ten of *scammony*, and six or seven of *gamboge*. But the most effectual preparation would seem to be that proposed by M. Peschier of Geneva—the ethereal extract, which has been called also O'LEUM FI'LICIS, and EXTRAC'TUM FI'LICIS ÆTHE'REUM, which contains not only the volatile oil, but also a fixed oil, tannic, gallic, and acetic acids, a muco-saccharine matter, green and red colouring matter, and a semi-resinous substance. It is made by digesting, in the cold, the root, cut small, for ten or twelve days, in a sufficient quantity of sulphuric ether; after which the strained liquor is evaporated until the ether is removed. (See the author's *New Remedies*, 3d edit. p. 246, Philad. 1841.) Peschier had known it to be successful in 150 cases, when he wrote; and Ullersberger had used it in 60 cases, and a medical friend of his in 200 cases, with invariable success. It is affirmed to have been found more successful against the *Bothriocephalus latus* than the *Tænia solium;* and a part of the discrepancy of results has been ascribed to this cause. For example, it has not been found as effectual in the treatment of tænia at Paris, and the entozoon most common is the Tænia Solium.

The dose of the ethereal extract is from twelve to twenty-four grains. It may be given in the form of pill or in molasses, for two or three nights in succession, and then be followed by a brisk cathartic.

The *Ethereal Tincture of the Buds of the Male Fern* (one part of the *buds* to eight of *ether*) has been used with advantage as an anthelmintic; and a decoction—in the proportion of an ounce of the *rhizoma* to a pint of *water*—has been occasionally prescribed.

6. GRANA'TI RADI'CIS CORTEX.—BARK OF POMEGRANATE ROOT.

Pu'nica Grana'tum or *Pomegranate;* Sex. Syst. Icosandria Monogynia; Nat. Ord. Myrtaceæ;—Granateæ (*Don*) appears to be a native of northern Africa, whence it was transported to Italy at the time of the Carthaginian wars. It is also indigenous in Bengal, China, and Persia.

The bark of the root—which is the part used as an anthelmintic—is usually in small fragments, in quills or portions of quills, of a yellowish, or ash-gray colour externally; and yellow within. It is brittle and not stringy, and has a faint peculiar smell, and an astringent taste. It has often been subjected to analysis; and has been found to contain, 1, a matter, which was considered to be peculiar, and to which the name *Granadin* or *Grenadin* was given (*Latour de Trie*), but which has been shown to be *mannite.* 2. Tannic acid, to which—as well as to a small portion of gallic acid—its astringency is owing; and 3. Resin. The analysis sheds no light on its anthelmintic properties. It yields its virtues freely to water.

Pomegranate root bark is rarely employed at the present day except as an anthelmintic, and not often with that view. It is said, when given in full doses, to induce nausea, vomiting and purging, and occasionally giddiness and faintness, which would seem to show, that it possesses acro-narcotic properties, on which its anthelmintic virtues may be dependent.

The testimony in favour of the bark as an anthelmintic has been discordant. It is especially in cases of tænia, that it has been employed; and numerous trials have been made with it in England, France, Germany and Italy; yet in extensive experiments at the Polyclinical Institute of Berlin it proved of no value; but this failure was referred to some imperfection in the drug. (See the author's *New Remedies*, 3d edit. p. 263. Philad. 1841.)

The fresh bark possesses far more virtue than the dried; the latter has, indeed, been regarded as inert. (*Mérat* and *De Lens.*) It is almost always given in decoction, which may be prepared with two ounces of the *bark*, boiled in a quart of *water* down to a pint and a half. Of this, the dose is f. ℥ij every half hour until the whole is taken. The formula, cited by Paris from Ainslie's '*Materia Medica of Hindusthan*,' directs it to be prepared with ℥ij of the *fresh bark*, boiled in a pint and a half of *water*, until only three quarters of a pint remain.

An *alcoholic extract of the bark of the root* is recommended by Deslandes. (*New Remedies*, loc. cit.)

7. AZED'ARACH.—AZEDARACH.

The bark of the root of *Me'lia Azed'arach;* Sex. Syst. Decandria Monogynia; Nat. Ord. Meliaceæ; is in the secondary list of the Pharmacopœia of the United States. The tree, termed ***Pride of China***, ***Pride of India***, ***Bead Tree***, and ***Poisonberry tree***, is a native of oriental countries; but is cultivated as an ornament in various parts of the world. It is very common in the southern states, but does not flourish farther north than Virginia.

The berries are reputed to be poisonous, yet they are said to be eaten by children at the south without inconvenience, and are considered to be anthelmintic. The bark of the root—the officinal portion—has a bitter nauseous taste. Its virtues are imparted to boiling water. It is regarded by many as one of the most valuable anthelmintics; and when given in large doses is unquestionably acro-narcotic. It is usually prescribed in decoction. (*Azedarach.* recent. ℥iv; *Aquæ*, Oij: coque ad Oj, et cola. Dose, f. ℥ss. every two or three hours, till it exhibits its effects on the stomach or bowels.)

8. FUCUS HELMINTHOCOR'TON.

Fucus Helminthocor'ton, *Helminthocor'ton* or *Corsican Wormweed;* Nat. Ord. Algæ;—Algaceæ (*Lindley*), is a marine plant, which grows on the coast of the Mediterranean, and especially of the Island of Corsica.

The whole plant is employed as an anthelmintic in Europe; but it is not used in this country. The American editors of the *Manual of Materia Medica and Pharmacy*, of Edwards and Vavasseur, affirm, that it is the best vermifuge with which they are acquainted, and that they witnessed in Corsica the most astonishing effects from it.

The dose of the powder is from gr. x. to ʒij mixed with molasses. It is also given in *infusion* and *decoction*, and it is affirmed, that when thrown into the rectum it "destroys any worms domiciliating there as effectually as choke-damp would destroy the life of a miner." (*James Johnson.*) Yet its effects on the economy are scarcely appreciable; and chemical analysis sheds no light in regard to its anthelmintic principle or principles.

9. SO'DII CHLO'RIDUM.—CHLORIDE OF SODIUM.

The value of common salt—whose general properties are described under CATHARTICS—as a condiment in the prevention of worms, has already been mentioned. (p. 205.) It was also remarked, that experiments have shown it to be detrimental to those entozoa when out of the body. Hence it has been administered as a true anthelmintic. Its cathartic agency might entitle it to be placed also under another of the divisions of anthelmintics.

When given as a true anthelmintic, it is generally in large doses, from ℥ss. to ℥j; and in cases of oxyures or ascarides vermiculares, it may be thrown into the rectum in strong solution.

10. TANACE'TUM.—TANSY.

The herb *Tanace'tum vulga'rē* or *Tansy:* SEX. SYST. Syngenesia Polygamia superflua; NAT. ORD. Compositæ Corymbiferæ; is an herbaceous plant, indigenous in Europe, but introduced into this country, where it grows wild in the road-sides, and is cultivated in the gardens. It flowers from July to September.

The whole herb has a strong, peculiar and disagreeable odour, and a nauseous, bitter, and aromatic taste. It has been subjected to analysis, and found to be essentially composed of volatile oil—*O'leum Tanace'ti*—which has the peculiar smell of the plant, and a warm bitter taste; and of a bitter matter, which is usually denominated extractive, but has been regarded as partly resinous. Still, the main properties are extracted by water, and all, probably, by alcohol.

Tansy is chiefly used as an anthelmintic in domestic practice. It is rarely prescribed by the physician, and is, therefore, placed in the secondary list of the Pharmacopœia of the United States. Its anthelmintic virtues are probably dependent both on the bitter principle and the volatile oil; the latter of which is more destructive to the parasites, whilst the former, like bitters in general, is adapted for giving tone to the digestive function and to the system in general; yet the seeds, which contain the largest proportion of the bitter principle, and the smallest of volatile oil, are said to be most effective. It is generally given in infusion—*Tansy*

Tea, prepared by infusing ℥ij. of the *herb* in Oj. of *boiling water*, the dose being from f.℥j. to f.℥iij.

The seeds might be given in powder, in the dose of from gr. xxx. to ʒj; or a few drops of the oil might be administered in molasses.

11. CREASO'TON.—CREASOTE.

(*For its general properties, see* Excitants.)

Several portions of tapeworm having been observed to be discharged during the administration of creasote, it was prescribed, in such cases, as a true anthelmintic. From five to eight drops may be given to adults in an ordinary dose of oleum ricini. It has likewise been associated with oleum tiglii.

II. *Mechanical Anthelmintics.*

12. MUCU'NA.—COWHAGE.

Mucuna, in the language of the Pharmacopœia of the United States, is the "bristles of the pods of *Mucuna pruriens, Dolichos pruriens, Stizolobium pruriens, Cowhage*, or *Cowitch*." Sex. Syst. Diadelphia Decandria; Nat. Ord. Leguminosæ—a climbing plant, indigenous in the West Indies. The pod or legume—as met with in the shops—is of a brownish colour, shaped like the italic *f*, containing four to six seeds, and covered with a pubes or stinging hairs—*setæ*—which, when placed on the skin, pierce it, and give rise to intense itching, and, in some persons, to cutaneous inflammation. The best application, in such cases, is oil. Rubbing the part always increases the local phenomena.

Mucuna has been long celebrated as a mechanical anthelmintic. That its action is mechanical is, indeed, proved by the circumstances, long ago observed, that worms, under its use, are discharged alive. When experiments, too, have been made on entozoa out of the body, the setæ have been observed sticking in them, and the animals twisting about evidently in great torture. That an anthelmintic effect is produced upon them by cowhage within the human body appears to be well supported. The testimony in favour thereof has been satisfactory, and the author himself has repeatedly seen its exhibition followed by the evacuation of entozoa after other anthelmintics had been given fruitlessly.

The difficulty has been to understand how it could act upon the worms, and not equally irritate the lining membrane of the intestines; hence the efficacy of the medicine has been discredited. It is impossible, however, to set aside the numerous facts that have been adduced in its favour; and it would seem, that the mucus, which covers the membrane, may prevent the setæ from penetrating it as it does the worms.

Mucuna has been considered best adapted for the removal of *Ascarides lumbricoides* or the long round worm, and *Oxyures vermiculares* or the small thread worm. The latter are, however, so low down in the intestinal canal, that its influence can scarcely be so powerful on them.

It may be given in the form of electuary, the pods being dipped in molasses, and the setæ scraped off until the mixture has attained the consistence of thick honey. Of this, a table-spoonful is a dose for an adult; a tea-spoonful for a child three or four years old. This may be administered for three nights in succession; and the following morning, a brisk cathartic may be given.

It is not much used in this country; and the framers of the last edition of the Pharmacopœia of the United States have transferred it from the primary to the secondary list.

13. PULVIS STANNI.—POWDER OF TIN.

Powder of Tin, *Granulated* or *Granular Tin*, is prepared by melting tin in an iron vessel over the fire, and, whilst it is cooling, stirring it until it is reduced to a powder, after which it is passed through a sieve. Tin may also be reduced to powder by shaking it, when melted, in a wooden box, the inside of which has been rubbed with chalk.

The testimonials in favour of this mechanical anthelmintic have been numerous. It has been strongly recommended not only in *Ascarides lumbricoides*, but also in *Tænia solium*. It was at one time conceived, that its good effects might be owing to its combination with arsenic, but this supposition has been negatived by the equal success following its use in a pure state. In all probability, it acts by the incessant annoyance occasioned by the friction of the particles of the tin, which renders the situation of the entozoa uncomfortable to them, and induces them to migrate; whilst the same friction on the mucous coat of the intestines increases their peristaltic action, and favours the object; or, if it fail to do this, it augments chylosis, and improves the general tone of the digestive system.

The dose to children is from ʒss. to ʒij. and more; to adults ℥ss. and more, in molasses, every night, for three nights. On the following morning a brisk cathartic may be given.

SECTION II.

AGENTS THAT AFFECT PROMINENTLY THE RESPIRATORY ORGANS.

EXPECTORANTS.

SYNON. *Anacathartica.*

DEFINITION OF EXPECTORANTS—ORGANS ON WHICH THEY ACT—MODUS OPERANDI—ARE INDIRECT AGENTS ONLY—INHALATIONS—SPECIAL EXPECTORANTS.

EXPECTORANTS are usually defined to be—"Agents, that promote the excretion of mucus and other fluids from the lungs and air passages."

To understand, whether we are possessed of any substances that exert a special action of this kind, it is necessary to inquire into the anatomical constitution of the bronchial tubes, and into the mode in which reputed expectorants may affect them.

The whole of the larynx, the trachea, and probably the bronchial tubes, are lined by a mucous membrane, whose office it is to secrete mucus, and to serve the purpose of the mucous membranes in general. From this membrane it is, that the humour of expectoration is secreted. Surrounding the air tubes, probably even in their minutest divisions, is a contractile coat, which has an important agency in the phenomena of expectoration. In the trachea, an obvious muscular structure exists in its posterior third, where the cartilages are wanting. It consists of a thin, muscular plane, the fibres of which pass transversely between the interrupted extremities of the cartilaginous rings of the trachea and the bronchia. The use of this muscular tissue, as suggested by Dr. Physick, and, since him, by Cruveilhier, Sir Charles Bell, and others, is to diminish the calibre of the air tubes in expectoration; so that the air, having to pass through the contracted portion with greater velocity, its momentum, in coughing, may remove the secretions, that are adherent to the mucous membrane. The phenomena of asthma, as Laënnec has correctly observed, occasionally exhibit a manifest temporary constriction of the minute bronchial ramifications, affording, indeed, every evidence of a spasmodic attack,—the essential cause being probably seated in the ramifications of the pneumogastric nerves distributed to the bronchial tubes, whilst, at other times, the phenomena indicate rather a paralyzed than a spasmodic condition of the fibres. (See the author's *Human Physiology*, 4th edit. ii. 105, Philad. 1841.)

The quantity, and facility with which the matter of expectoration is secreted, must depend upon the condition of the mucous membrane. Occasionally, indeed, the sputum is derived from the breaking down of tubercles, or from positive abscesses in the lungs, but these are not the most common cases in which expectorants are employed;—such, at least, as are regarded to exert a specific agency on the lining membrane of the air passages, when taken into the stomach, or introduced, in any manner, into the circulation. If the bronchial mucous membrane be inflamed, as in acute bronchitis, the secretion from it may be wholly arrested for a time, after which it may become augmented, as in cases of inflammation of the mucous membranes in general; or, if the inflammation be to a less extent, and protracted, a profuse secretion may take place from it, attended with every symptom of general asthenia, as in some of the cases of winter-cough or chronic bronchitis of old people. In these different conditions of the mucous membrane, a different condition of expectorant medication must be demanded. In the former, marked by every sign of internal inflammation, the antiphlogistic plan is imperiously required; whilst in the latter, depletion is by no means indicated, and, on the other hand, general and local excitants may be found advisable. These, however, are indirect expectorants—adapted for the removal of the condition of the system, which gives rise to the diminished or augmented secretion from the bronchial mucous membrane.

Again, when the sputa are secreted, they often adhere to the membrane, and are expelled with difficulty; at times, because the inflammatory condition, above mentioned, does not admit of their ready detachment; and, at others, owing to a want of due vigour in the system in general, and in the muscles, concerned in expectoration, in particular. In the former case, antiphlogistics, nauseants, &c., become indirect expectorants; in the latter, substances, which, like ammoniacum, myrrh, and the different balsams, are excitants; or, again, agents, that are capable of inducing emesis, during the succussion accompanying whose operation, the mucus becomes detached, and its expulsion favoured. In these cases, a nauseating emetic is most beneficial, if inflammatory irritation exists to any extent; as, during the nausea, which precedes emesis, the secretion from the bronchial mucous membrane is favoured, and by the act of vomiting succeeding to the secretion, the mucus is readily detached, and expectorated. In this way, consequently, nauseants and emetics become expectorants.

All these, however, are indirect agencies only, and it is important to inquire, whether there be such remedies as *direct expectorants*, or, in other words, any that act on the bronchial mucous membrane specifically, or by preference, after having been received into the stomach, and entered the mass of blood; for, it is manifest, that this is the only mode in which any internal expectorant can come into immediate contact with the seat of the mischief. The expectorant, whatever it may be, must be received into the circulation, either by imbibition through the coats of the gastro-intestinal blood-vessels, or through the chyliferous vessels. In either case, it must proceed to the heart, and pass with the blood of the bronchial artery to the bronchial mucous membrane; and although it cannot be denied, that many local excitants, when received into the blood-vessels, affect the particular parts of the frame on which they act by preference, we have no sufficient reason for the belief, that this is the case with any one of the remedies, that are reputed to be expectorants. None of them appear to affect the bronchial mucous membrane by preference: they exert upon it an indirect agency only. An attentive examination of the properties ascribed to the different agents, ranked under this division, can scarcely fail, indeed, to lead the intelligent therapeutist to the deductions of Dr. Paris. "If the term *expectorant*," he remarks, "be intended to express a medicinal substance, which has the power of promoting the expulsion of fluid from the lungs, by some *specific action* on the parts concerned, we can have no hesitation in at once rejecting the word, and denying the existence of such remedies: if, however, the term be received conventionally, as comprehending all those substances, which are capable, according to the state of the system in each particular case, of producing expectoration, it will be extremely proper to recognize, and particularly useful to retain, such a class of medicinal agents." A still more recent writer (*Spillan*) has remarked, that "there probably exists no class of medicines, which so fully establish the truth of the principle, that medicines are but relative agents, as the class now under consideration."

These are the only views, that can be rationally maintained, and much careful discrimination, accordingly, becomes necessary to determine upon the precise kind of indirect agency that may be demanded in any particular case: immense mischief has, indeed, been done by the promiscuous prescription of reputed expectorants, under circumstances contra-indicating their employment. The pathology of many of the varieties of cough has been but little attended to, until of late years. Its frequent identity with bronchitis was not suspected, or, if suspected, disregarded. Expectorants, in such cases, were freely administered,—that is, substances considered to be possessed of direct powers over the parts concerned in the formation of the matter of expectoration; and as almost all these remedies belonged to the class of excitants, it may be imagined, that mischief frequently followed their administration. This, every practitioner must have witnessed from the injudicious use of excitant cough mixtures, often administered when the system has been labouring under general febrile indisposition, connected with, or dependent upon, the bronchitis, for which the expectorant was originally recommended. The judicious practitioner, in such cases, whilst he pays proper attention to the febrile and inflammatory symptoms, generally restricts himself, as far as may be, to the employment of demulcents. These, by passing over the top of the larynx, soothe the mucous membrane with which they come in contact, and, by continuous sympathy, the soothing influence is propagated to the part of the bronchial mucous membrane labouring under irritation.

Almost every division of medicinal agents may become expectorant, according to the precise condition of the system generally, or of the pulmonary organs particularly; and hence we find an expectorant effect equally from depletives, and from tonics and excitants; from narcotics and counter-irritants; and from nauseants and emetics.

INHALATIONS.

But although the existence of any internal expectorant—acting through the stomach and the circulation on the lining membrane of the air passages—may be doubted, there is a mode of exhibiting remedies, so that they may come into immediate contact with the bronchial mucous membrane, so as to modify its functions effectively,—through the introduction of different agents by INHALATION. In this way, soothing or relaxing vapours may be made to act upon the inflamed membrane, especially after the violence of inflammatory action has been previously somewhat subdued by appropriate antiphlogistics; accordingly, under such circumstances, the vapor of *hot water* is employed with much advantage, and, in cases of asthma, relief is occasionally obtained by the addition of some *volatile oil*, as by inhaling the vapour from a *hot infusion of chamomile flowers*. With the same view, *ether* is occasionally added. In some cases of asthma, there appears to be a condition of the pneumogastric nerves somewhat resembling paralysis, which excitants, introduced in the manner referred to, are as well adapted to remove as any other agents. The vapours of burning substances, as of tar and resin, are occasionally inhaled, and they may be employed with advantage in chronic bronchitis, when the inflammation is of an asthenic character, or when the activity of the inflammation has passed away, and the copious secretion from the membrane is the most annoying symptom. The vapors of *boiling tar* were, at one time, strongly recommended by Sir A. Crichton in consumption, but experience has shown that not much reliance can be placed upon them in that fatal malady; and many of the cases of benefit, derived from such inhalation, have probably been of the kind just referred to—cases of *chronic bronchitis.*

The practice of smoking the roots of *stramonium* in asthma, and other pulmonary affections, has long existed, and frequently essential benefit is derived from it. There is something inexplicably capricious in this singular disease. Whilst one asthmatic cannot sleep in town, another cannot remain in the country. A friend of the author, a most respectable inhabitant of Baltimore, is unable to sleep at his country house, which is not more than a mile and a half from the centre of the town. He has tried the experiment frequently, and the result has been always the same. The author knows another individual, who cannot exist in the impure atmosphere of towns. Others, again, prefer a dry, whilst many breathe more freely in a moist atmosphere. The same thing, of course, applies to medicinal agents inhaled by the lungs. *Tobacco* relieves some, and aggravates the symptoms of others; but the smoke of stramonium agrees with a large majority of persons, and at times affords manifest relief. When suffering under a severe attack of the disease, the gentleman, above referred to—as unable to sleep in the country—has frequently made manifest to his medical attendant the relief he derives from its inhalation. For this purpose he employs the dried stalk. Others use the root, and others the leaves only. (For similar cases, see the author's *Practice of Medicine,* i. 338, Philad. 1842.)

It is, too, in the way of inhalation, that the different *gases* have been used therapeutically. They were first proposed by the enthusiastic Beddoes, and are certainly capable of affecting the frame—some as excitants, others as sedatives;—but difficulties, connected with their efficient administration, and uncertainty in the results obtained, have led to their almost total abandonment. They pass through the bronchial tubes, penetrate the blood-vessels by imbibition, and exert their appropriate agency, either on the nerves distributed to the blood-vessels, or affect the great nervous centres, by reaching them through the circulatory current; but such agents cannot properly be ranked as expectorants.

SPECIAL EXPECTORANTS.

I. *Excitant Expectorants.*

1. SEN'EGA.—SENEKA.

Seneka, *Seneka snakeroot* or *rattlesnake root*, is the root of *Poly'gala Sen'ega;* Sex. Syst. Diadelphia Octandria; Nat. Ord. Polygaleæ, an indigenous plant common in every part of the United States, but abounding especially in the southern and western portions, where it is collected for use.

As met with in the shops, seneka is of different sizes, from that of a writing quill, to that of the little finger, having a thick knotty head, which exhibits traces of the numerous stems. It is contorted, often marked by crowded annular eminences, with a projecting line running along its whole length. The cortical portion is corrugated, cracked transversely, and of a yellowish-brown or grayish-brown colour. The smell is strong and peculiar in the fresh root, but faint in the dried; and the taste is at first sweetish and mucilaginous, having a peculiar acrid sensation in the fauces.

The whole of the virtues are resident in the cortical portion, the woody matter being inert, and therefore to be rejected, should the seneka be reduced to powder. These virtues are yielded to boiling water, and to alcohol, especially to dilute alcohol. They seem to be partly dependent upon a substance called *Senegin, Polygalin* and *Polygalic acid*, which has been esteemed by some to be an alkaloid; by others an acid; and which, when given to dogs, in the dose of 6 or 8 grains, has caused vomiting, difficult respiration, and death in three hours.

Seneka has been regarded as one of the best of the excitant expectorants; and in the form of *syrup of senega* is largely used both in hospital and private practice, especially by those who prescribe according to a system of routine, and are guided by names rather than by phenomena. It is clearly excitant; and, therefore, not adapted for facilitating expectoration in affections of the chest of an inflammatory character. Yet, like the squill, it forms part of a compound syrup—the *Syrupus scillæ compositus*—associated with nauseating and emetic substances, which certainly fill contrary indications; and—as elsewhere remarked—it is probable, that most, if not all of the benefit in many cases derived from the preparation is due to the nauseants and emetics contained in it.

Dr. Pereira assigns to seneka a sphere of action, which is inexplicable; and to the author—who has employed it largely—incredible. "In this country" (England)—he remarks—"senega is comparatively little employed. It is an exceedingly valuable remedy in the latter stages of *bronchial* or *pulmonary inflammation*, when this disease occurs in aged, debilitated, and torpid constitutions, and when the use of depletives is no longer admissible. It appears to re-establish a healthy condition of the secreting organs, to promote the resolution of the morbid deposits, and to give strength to the system. I usually administer it in combination with ammonia, which appears to me to promote its beneficial operation. Frequency of pulse, and a febrile condition of the system are by no means to be regarded as impediments to the use of this medicine."

Seneka is rarely—if ever—given in powder. Should it be desired to administer it in this form, the dose may be from ten to twenty grains.

DECOCTUM SENEGÆ, DECOCTION OF SENEKA. (*Senegæ*, cont. ℥j; *Aquæ* Oiss. Boil to a pint.) This decoction is by no means as much used as the syrup, the saccharine matter of which is itself demulcent, and therefore adapted for relieving cough and facilitating expectoration. Sugar, or liquorice root, or extract of liquorice, may, however, be added to it.

SYRUPUS SENEGÆ, SYRUP OF SENEKA. (*Seneg.* cont. ℥iv; *Aquæ* Oj; *Sacchar.* ℔j. Made into a syrup, either in the ordinary method or by displacement.) The dose as an expectorant is f. ʒj. to f. ʒiij. It is a common adjunct to expectorant mixtures, and, in too many cases, for no other reason than because it bears the name of an expectorant, without regard to the pathological condition, or any adaptation to it.

2. SCILLA.—SQUILL.

Squill—the general properties of which have been detailed, (p. 119)—is often prescribed both with excitant and sedative expectorants; yet the union with the latter, in the small doses in which it is usually exhibited, cannot be philosophical, inasmuch as it is unquestionably excitant; and, therefore, adapted for cases of pectoral disease, in which there is an absence of all febrile and inflammatory phenomena, and a demand rather for excitant expectorants in general.

When given as an expectorant, in powder, which is rarely the case, it is usually in the dose of one grain, two or three times a day. As, however, it is a nauseant in a sufficient dose, it may be adapted, in a larger quantity, for affections in which sedatives are needed. In such cases, it must be pushed, until its influence on the stomach is exhibited.

The *Acetum Scillæ* (p. 120) is occasionally prescribed as an expectorant, in the dose of f. ʒss to f. ʒj; but by no means so frequently as the *oxymel* (p. 120) and the syrups—simple and compound (p. 120); the former in the dose of f. ʒj to f. ʒij; the *Syrupus Scillæ* in the dose of a fluidrachm or two; and the *Syrupus Scillæ Compositus* or *Hive Syrup*, in the dose of twenty or thirty drops.

The *Tinctura Scillæ* (p. 120) is rarely given alone; but is often added to pectoral mixtures. Its dose is from twenty drops to a drachm.

PIL'ULÆ SCILLÆ COMPOS'ITÆ, COMPOUND PILLS OF SQUILL. (*Scill.* in pulv. ʒj; *Pulv. Zingib.; Pulv. Ammoniac.* āā ʒij; *Saponis*, ʒiij; *Syrup.* q. s. to be divided into 120 pills.) The dose of this is, from 5 to 10 grains.

3. AMMONI'ACUM.—AMMONIAC.

The botanical history of ammoniacum has been a matter of uncertainty. Recently, however, owing to the researches of observers in India, it has been referred to *Dore'ma Ammoni'acum;* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ, a native of Persia, of which it is the concrete juice. The whole plant contains a large quantity of a milky juice, which oozes out, whenever punctures are made, even at the ends of the leaves. It would appear, however, that these are never made artificially, but that innumerable beetles pierce the plant in all directions; and, when dry, the ammoniac is picked off, and collected. Dr. Pereira states, that he has, in his museum, the upper part of the apparently flowering stem, about ten inches long, with lumps of of ammoniac sticking to it at the origin of every branch.

Ammoniac, as met with in commerce, usually comes from Bombay, but sometimes from the Levant. It is either in the state of tears, or in lump. The former is in more or less spheroidal tears, but often in larger pieces, of an irregular shape. Externally, they are of a yellowish colour, and whitish within. At ordinary temperatures, they possess considerable hardness, but soften under the heat of the hand.

Lump ammoniac consists of whitish tears, imbedded in a substance of a darker colour, and containing numerous extraneous matters,—as seeds, fragments of vegetables, and dirt. The odour of both varieties is peculiar, and by no means agreeable; and the taste nauseous, bitter and somewhat acrid.

Ammoniac is a gum-resin, which has been subjected to analysis by many chemists, and found to consist of about 70 per cent. of resin, and about 20 of gum. It contains also a volatile oil, which is separable by distillation with water. With this fluid, it forms a preparation, which is officinal—the *mistura ammoniaci.* The alcoholic solution, which is transparent, becomes milky on the addition of water.

Ammoniac has been long employed as an expectorant of the excitant class, and, consequently, in cases in which there was little or no inflammatory action. It would not seem, however, that its excitant properties are active, and, from the author's experience, it is not entitled to the credit that has been assigned it in chronic bronchitis, and catarrhal affections in general. Such, indeed, appears to be the prevalent belief, if we judge by the much smaller employment of the drug now than formerly.

The dose of ammoniac is generally stated to be from ten grains to thirty, in pill. It is rarely given in this simple form, but in combination with other reputed expectorants, as in the *Pilulæ Scillæ compositæ* of the Pharmacopœias of Edinburgh and the United States, or the *Pilulæ Ipecacuanhæ compositæ* of the London Pharmacopœia, (*Pulv. Ipecac. comp.* ʒiij; *Scillæ,* recentè exsiccat., *Ammoniac.* āā ʒj; *Mucilag. acaciæ,* q. s. ut fiat massa. Dose, five grains to ten.)

MISTU'RA AMMONI'ACI, AMMONIAC MIXTURE. (*Ammoniac.* ʒij; *Aquæ,* Oss.) This mixture was formerly called *Lac Ammoni'aci,* owing to its white appearance. The gum of the gum-resin forms a mucilage, by which the resinous portion is suspended. The greater part of the resinous matter subsides, however, on standing. When given alone in pectoral affections, the ordinary dose is one or two table-spoonfuls. It not unfrequently forms a vehicle for other agents, as *Tincture of Opium, Syrup of Seneka,* &c.

4. MYROX'YLON.—BALSAM OF PERU.

Balsam of Peru is the juice of *Myrox'ylon Peruif'erum* or *Myrosperm'um Peruif'erum*: Sex. Syst. Decandria Monogynia, Nat. Ord. Leguminosæ, which is indigenous in Peru, New Grenada, Columbia and Mexico.

In regard to its history, there is some uncertainty. It has been affirmed, that there are two modes of obtaining it—one by incisions made into the bark of the tree, and the other by boiling the branches and trunk in water;—the former yielding a white liquid balsam; the latter a blackish-red liquid. The former, it is said, may be preserved for years in the fluid state; but if deposited in calabashes, which is commonly done in the mountains of Tolu, after some time it condenses, and hardens into resin; and is then termed *dry white balsam* or *balsam of Tolu;* whilst the extract, made by boiling the bark in water, is blackish, remains liquid, and is known by the name of *black Peruvian balsam.* There seems still, however, to be a doubt, whether the black Peruvian balsam of the shops be prepared by coction. The quantity of balsam of Peru on which duty was paid in England, in the year 1839, was 825 lbs. (*Pereira.*)

Balsam of Peru is transparent, of a deep reddish-brown colour, and of the consistence of molasses. It has a fragrant aromatic odour; and a hot and bitter taste. It is soluble in alcohol, and miscible with water by means of mucilage. Its specific gravity is variously stated, from 1.14 to 1.16. It is rarely adulterated. When subjected to analysis, it yields 88 per cent. of resin, 12 of benzoic acid, and a trace of volatile oil. Prolonged boiling in water removes from it the benzoic acid, but nothing else.

Balsam of Peru was at one time much used as an excitant, both in external and internal ulcerations; and hence it has been prescribed as an expectorant in phthisis; and also in chronic bronchitis, and wherever a gentle excitant is needed. The dose is f. ʒss. to f. ʒi. dropped on sugar, mixed with molasses, or diffused in water by means of mucilage or yolk of egg.

5. TOLUTA'NUM.—BALSAM OF TOLU.

Balsam of Tolu is now considered to be the juice of *Myrox'ylon Toluif'erum*; Sex. Syst. Decandria Monogynia: Nat. Ord. Leguminosæ, which is indigenous in the mountains of Tolu especially. It is obtained by making incisions into the trunk of the tree, collecting the juice, as it exudes, in appropriate vessels, and allowing it to concrete. It is commonly imported in little calabashes; and it does not appear to differ from the concrete white Peruvian balsam, which, indeed, as stated above, is termed balsam of Tolu. It is imported chiefly from Carthagena.

When it first arrives in the country it is usually soft and tenacious; but, when kept, becomes hard and brittle, somewhat like resin. It is transparent, of a yellowish-brown colour, has a highly fragrant odour, and a sweetish, not disagreeable taste. It is very soluble in alcohol, ether, and the essential oils, and yields its benzoic acid to boiling water. Its chemical composition is similar to that of balsam of Peru.

Balsam of Tolu is employed as an expectorant in the same cases as balsam of Peru, and is far more frequently prescribed.

It has never appeared to the author to possess any special agency in chronic bronchitis, but it makes an agreeable adjunct to cough mixtures in the form of the *Syrup of Tolu.* In chronic catarrhal affections, the inhalation of the vapour of the ethereal solution is said to have been of benefit.

The dose is from gr. x. to gr. xxx. repeated from time to time. It may be given in the form of an emulsion made with mucilage of gum arabic. (*Tolutan.* ʒi; *Mucilag. acaciæ* ℥ss; *Syrupi* ʒiij; *Aquæ* ℥v. M.)

TINCTU'RA TOLUTA'NI, TINCTURE OF TOLU. (*Tolutan.* ℥iij; *Alcohol* Oij.) It is sometimes added to pectoral mixtures, but is chiefly employed in the formation of the syrup.

SYR'UPUS TOLUTA'NI, SYRUP OF TOLU. (*Tinct. Tolut.* f. ℥i; *Syrup.* Oiss.) This is a very common adjunct to pectoral mixtures, to which it appears to communicate no virtues, but improves their flavour. Yet MM. Trousseau and Pidoux affirm, that they have cut short by it acute bronchitis, "which had reached the first septenary," and which, they think, "would doubtless have gone on for a month or six weeks without the aid of this precious agent." In infants, it appeared to them of immense advantage in pulmonary catarrh, almost at the very onset of the affection, and still more "when the state of irritation, dryness and turgescence of the mucous membranes having been allayed, the catarrhal secretion began to be effected."

Balsam of Tolu is an ingredient in the *Tinctura Benzoini composita* of the Pharmacopœia of the United States.

6. STYRAX.—STORAX.

Storax is the concrete juice of *Styrax officina'lē;* Sex. Syst. Decandria Monogynia; Nat. Ord. Styraceæ, (*Lindley,*) a small tree, which is indigenous in Asiatic Turkey and Greece, and is cultivated in the southern parts of Europe. From incisions made into the tree, or from the punctures of an insect, the storax exudes. No precise knowledge exists as to the mode in which it is procured; as the natives of the country, who collect it, will not communicate their mode of procedure. It is imported into Great Britain from Trieste.

Two varieties are met with in the shops;—*common storax, styrax calami'ta* of some, and *liquid storax.* The former occurs in brittle cakes, several pounds in weight, of a reddish brown colour, and having a fragrant, agreeable, balsamic odour, and an aromatic taste. It appears to be composed of sawdust, cemented by a resinous matter. It can be easily reduced to coarse powder, and in this state is often met with in the shops. The latter has been supposed to be derived by decoction from *Liquidambar styracif'lua;* but Dr. Wood remarks, that some of the genuine juice of the Liquidambar, brought from New Orleans, which he had an opportunity of inspecting, had an odour entirely distinct from that of Storax. Moreover, it has been recently affirmed, that the liquid storax, or *storax oil,* is obtained at Cos and Rhodes from styrax officinale. By means of longitudinal incisions, the bark of the stems is removed in small narrow strips, which, when pressed together, readily adhere by means of their glutinous juice, and, in this way, they are made up into bundles of about two pounds each. These are then subjected to pressure in warm presses, by which means a liquid storax is obtained, which has the consistence of butter, a gray colour, and an odour resembling that of vanilla. (*Landerer,* cited by *Pereira.*) It is doubtful, however, whether this be the liquid storax of the shops, which is of a brown, almost black colour on the surface that is exposed to the air, but of a light greenish gray colour within, and of a smell somewhat resembling that of the Balsam of Peru.

Dr. Pereira has described not less than ten varieties of storax, but the above are all that concern the pharmacologist,—the others being rarely met with in commerce, and most of them never seen on this side the Atlantic.

When subjected to analysis, storax yields a trace of volatile oil, about fifty per cent. of resin, and one or two per cent. of benzoic acid, the presence of which entitles it to a place among the balsams. It is so mixed—in the state in which it is met with in the shops—with extraneous matters, that it requires to be purified; this is done according to a process directed in the British and American Pharmacopœias for **STYRAX PURIFICATA** or *purified storax,* which consists in dissolving the soluble matters in alcohol, straining the solution and distilling off the alcohol, until the storax acquires the proper consistence. The volatile portion is not driven off by the heat of boiling alcohol, yet it may be well not to carry the concentration too far, in order that the fragrant principle may be better retained, and the extract be of a fitter consistence for forming pills. (*Christison.*)

Storax, like some of the articles already mentioned, has been considered to possess "stimulant properties, which are more particularly directed to the mucous surfaces, especially to the bronchial membrane;" but it may be doubted, whether either it or any of the articles referred to, be possessed of such powers. Like the other balsams, however, it is excitant, and might be employed in chronic catarrhal affections of the bronchia, in which excitant expectorants are needed. It is not often prescribed on this side the Atlantic, or, indeed, anywhere; notwithstanding that the British colleges have a formula for the *Pilulæ Styracis Compositæ*, which consist essentially of *strained storax* and *opium*, and are occasionally given in chronic pulmonary affections to relieve cough; but are more valuable, perhaps, as a means of administering opium to persons who are prejudiced against it, the name, and the balsamic character of the storax completely masking the narcotic.

Should it be desired to administer storax, the dose may be ten to twenty grains two or three times a day,—or either the common, or the liquid storax may be suspended in water by means of mucilage of gum arabic.

Storax enters into the composition of the *Tinctura Benzoini Composita* of the Pharmacopœias.

7. BENZO'INUM.—BENZOIN.

Benzoin or *Ben'jamin* is the concrete juice of *Styrax Ben'zoin;* the *Benjamin Tree;* SEX. SYST. Decandria Monogynia; NAT. ORD. Styraceæ,—a tall tree, indigenous in Sumatra, Borneo, Siam and Java. It is obtained in Sumatra, when the tree is about six years old, by making incisions in the bark, and allowing the juice to remain for three months. Fresh incisions are made after the concrete juice has been removed, until the tree is exhausted, and usually dies. The juice, which exudes at the first incision, is the best, and said to be alone exported to Europe. (*Christison.*) Each tree yields about three pounds of Benzoin annually for ten or twelve years.

Benzoin, which is met with in commerce, is usually imported into England from Singapore or Calcutta. In 1839, duty was paid there on 108 cwts. (*Pereira.*) It is of different degrees of fineness, and is sometimes distinguished into *firsts, seconds*, and *thirds;* or more commonly, perhaps, into *firsts* and *seconds*, or *fine* and *coarse;* and sometimes the finer kinds are termed SIAM BENZOIN; the commoner, CALCUTTA BENZOIN. The former contains white grains, which have the appearance of fragments of blanched almonds, that are seated in a deeper reddish brown ground; the latter is more uniform, and has a dark reddish brown or almost black colour. Both are firm and pulverizable, of an agreeable, fragrant balsamic odour, and a slightly aromatic taste. Boiling water takes up a little benzoic acid; alcohol dissolves all except the impurities, and the solution is rendered milky by the addition of water.

Its chief constituents are resin, benzoic acid, and a trace of volatile oil,—the amygdaloid benzoin containing 80.7 per cent. of resin, and 19 8 of benzoic acid; the coarser or brown benzoin, of 78.5 per cent. of resin, and 19.7 of benzoic acid.

Benzoin had at one time a much higher reputation, as an internal remedy, than it has at present. Like the balsams and gum-resins, it was regarded as an excitant expectorant; and, as a relic of antiquity, it still holds its place in one or two formulæ. Should it be prescribed at all, it ought to be in pulmonary affections, which are unaccompanied by febrile or inflammatory excitement. It will be seen afterwards, that it is employed as a topical expectorant in the form of fumigation; and it is one of the ingredients of the fumigatory pastilles, which are largely used in oriental climes; and of the fumigating compounds employed in the Romish church.

Benzoin is scarcely ever—if ever—administered in substance. The dose of the powder may be from ten to thirty grains.

TINCTU'RA BENZO'INI COMPOS'ITA, COMPOUND TINCTURE OF BENZOIN.—(*Benzoin.* ℥iij: *Styracis purificat.* ℥ij; *Tolutan.* ℥j. *Aloës*, in pulv. ℥ss; *Alcohol* Oij.) The dose of this preparation, as an excitant expectorant, is f. ʒss. to f. ʒij. It is rarely, however, employed. As the resin is precipitated on the addition of water, it may be made into an emulsion by means of mucilage of gum arabic. It is chiefly used as an external excitant to ulcers.

8. AC'IDUM BENZO'ICUM.—BENZOIC ACID.

Benzoic acid, formerly termed *Flowers of Benjamin*, exists in the various balsamic substances, as benzoin, storax, tolu balsam, &c. It is also met with in the vanilla pod, and in certain animal substances, as in the urine of children and of the herbivora under certain states of decomposition. In Pharmacy, it is obtained from benzoin by sublimation. Benzoin, in coarse powder, thoroughly mixed with an equal weight of fine sand, is put into a proper vessel, and, by means of a sand bath, with a gradually increasing heat, it is sublimed until vapours cease to rise. The sublimed matter is deprived of oil by pressure in bibulous paper, and is again sublimed.

Benzoic acid, as met with in the shops, is in light white feathery crystals, of an agreeable odour, and an acrid, feebly acid taste. It is fusible, and wholly volatilizes if cautiously heated; is soluble in about two hundred parts of cold water, and in about twenty-five parts of boiling water; is very soluble in alcohol, and readily dissolves in solution of potassa, from which it is precipitated by chlorohydric acid.

The therapeutical action of benzoic acid is, doubtless, excitant, and it has been imagined, that its influence is principally directed to the mucous surfaces, and "especially to the aerian membrane." (*Pereira*, and others.) The author has not had the slightest reason for believing in this special affinity, and such would appear to be the general feeling of the profession, as it is now scarcely used except in one or two officinal preparations, in which it seems to be retained only from old prepossessions and associations.

When given alone as an excitant expectorant, its dose is from ten to thirty grains; but the author has never administered it, or seen it administered, as such. It is occasionally used, as will be seen hereafter, as a topical expectorant; and forms part of the *Tinctura opii camphorata* or *Paregoric elixir*, in which it probably exerts no beneficial agency.

9. COPA'IBA.

Copaiba—whose general properties are described under EXCITANTS—has been much extolled by many respectable practitioners in cases of chronic bronchitis, and in every form of pulmonary affection, in which a gentle excitant is necessary. It is not adapted for cases in which there is febrile or inflammatory action. Dr. La Roche, of Philadelphia, has adduced strong testimony in favour of it in diseases of the bronchial mucous membrane, of the atonic kind, as well as in diseases of the mucous membranes in general. It may be given in the dose of twenty or thirty drops on sugar, or made into an emulsion. (*Copaib.* f. ʒiss; *Mucilag. Acaciæ*, ʒvj; *Syrup.* ℥ss; *Aquæ*, ℥ivss.—M. Dose, one-fourth part four times a day.)

10. MYRRHA.—MYRRH.

Myrrh is the concrete juice of *Balsamaden'dron Myrrha;* SEX. SYST. Octandria Monogynia; NAT. ORD. Terebinthaceæ; a small tree, which is indigenous in Gison, on the borders of Arabia Felix. It exudes from the bark of the tree, and concretes there. Formerly, the finest kind of myrrh was imported from Turkey, and an inferior variety from India; but it would seem that, at the present day, it almost all comes from the latter country. A considerable quantity of it is consumed; for, in the year 1839, no less than 216 cwt. paid duty in England. (*Pereira.*)

The myrrh of the shops is in irregular pieces of various sizes, differing in colour,—the best pieces being of a reddish-yellow, and translucent. It is brittle, and capable of reduction to powder, and has a peculiar, somewhat agreeable odour, and a bitter aromatic, but, in the author's opinion, disagreeable taste. The best myrrh should possess these qualities; but other varieties are occasionally met with,—a second quality, which is in distinct small tears or grains,—and a third quality, which occurs in pieces of a darker colour than the best, and which are probably coarser myrrh mixed with impurities. (*Pereira.*)

Myrrh is only partially soluble in water, alcohol, and ether; the gum enables the water to suspend a part of the resin. Dilute alcohol dissolves some of the resin, and less of the gum; whilst alcohol dissolves the resin and volatile oil, leaving the greater part of the gum; and as the two first are the active ingredients in myrrh, alcohol is generally used as the menstruum. The most recent analysis afforded 2.6 per cent. of volatile oil, 27.8 of resin, and 63.7 of gum.

Myrrh has been employed as an expectorant. From its constituents, it is obviously excitant, and, therefore, not adapted for any pulmonary affection in which there is vascular excitement. It has been occasionally prescribed in the same cases as the other excitant expectorants, but is not much used at the present day, and never, perhaps, except in combination. The dose is from gr. x. to gr. xxx. in the form of pill. It may also be made into an emulsion, but its taste is an objection to it in this form.

TINCTURA MYRRHÆ, TINCTURE OF MYRRH. (*Myrrh.* contus. ℥iv; *alcohol.* Oiij.) Tincture of myrrh possesses all the virtues of the drug, but it is scarcely ever prescribed internally. The dose, as an expectorant, is stated to be f.ʒss. to f. ʒj.

Myrrh enters into the composition of various officinal formulæ, as of the *Mistura Ferri composita;* the *Pilulæ aloes et Myrrhæ;* the *Pilulæ Ferri compositæ;* and the *Pilulæ Rhei compositæ* of the Pharmacopœia of the United States.

11. ASSAFŒTIDA.—ASSAFETIDA.

Assafetida,—whose general properties are described under ANTISPASMODICS—is excitant, and therefore adapted for cases in which there is a want of due innervation in the respiratory apparatus, and, at the same time, no febrile or inflammatory action. In hooping-cough, it has been regarded as beneficial; but the author has subjected it to extensive trials, and has not been able to say positively, that any markedly good effects have resulted from it. In this disease, it doubtless acts by virtue of the new impression it makes on the nerves, and is more properly an antispasmodic.

In old cases of chronic bronchitis, and of chronic cough accompanied by nervous erethism, occurring in any disease, it is prescribed. The dose is from gr. v. to ʒss. in the form of pill; but it is rarely given alone, in this shape, as an expectorant.

MISTU'RA ASSAFŒ'TIDÆ, ASSAFETIDA MIXTURE. (*Assafœtid.* ʒij; *aquæ*, Oss.) The gum of the assafetida is sufficient to cause the suspension of the resin, so that the *Lac Assafœtidæ*—as it was formerly called—contains the main virtues of the gum-resin. In the thoracic affections for which assafetida is deemed proper, this is a good form of administration. For children, it may be sweetened with sugar; and although it may be disagreeable to them at first, they soon become accustomed to, and even fond of, it. The dose to an adult is f. ℥ss. to f. ℥ij.; to a child, one or two teaspoonfuls.

12. GAL'BANUM.

Galbanum,—whose general properties are described under ANTISPASMODICS,—possesses the same excitant virtues as the other, so called, antispasmodic gum-resins, and is presumed to hold an intermediate place between ammoniacum and assafetida as an expectorant. It is very rarely, however, used as such;—on this side of the Atlantic, never perhaps. The dose is from gr. x. to xxx. in the form of pill, or made into an emulsion.

13. AL'LIUM.—GARLICK.

The bulb of *Al'lium Sati'vum*, SEX. SYST. Hexandria Monogynia; NAT. ORD. Liliaceæ (*Lindley*), is a well known culinary article, and although not much used in medicine, is introduced into the Pharmacopœias of Great Britain, and this country. Garlic is indigenous in the Southern countries of Europe, flowering in July, and is every where cultivated in the kitchen gardens.

The strong, peculiar, irritating smell, and acrid taste of garlic are owing to volatile oil, separable by distillation with water,—six drachms of which are obtained from twenty pounds of garlic. An acrid expressed oil can also be separated from it. The volatile oil has a very acrid taste, and strong smell.

Like all substances whose medicinal virtues are dependent upon volatile oil, garlic is excitant; and, consequently, when employed as an expectorant, it can only be in cases, where there is no active inflammation of the lining membrane of the bronchial tubes; and in states of the system and of the tubes, in which a gentle excitant is necessary, as in chronic bronchitis. In such cases, the expressed juice may be mixed with sugar; or the following preparation may be advised:

SYR'UPUS AL'LII, SYRUP OF GARLICK. (*Allii* recent. ℥vj; *Acet. destillat.* Oj; *Sacch.* ℔ij; f. Syrupus.) The vinegar is used, in this preparation, under the idea, that it is a better solvent of the active principle than water, which may be questioned. It is occasionally given to children affected with ordinary catarrh, in the dose of a tea-spoonful or two, but is not much prescribed by the physician. It is an officinal preparation in the Pharmacopœia of the United States, but not in that of any British College.

14. IN'ULA.—ELECAMPANE.

Elecampane is the root of *In'ula Helen'ium*, Sex. Syst. Syngenesia Polygamia Superflua: Nat. Ord. Compositæ Asteroideæ, a large handsome plant, which is indigenous in various parts of Europe; flowering in June and July. It has become naturalized in this country, and is cultivated in the gardens, and for medical use. The root is officinal in the secondary list of the Pharmacopœia of the United States.

As met with in the shops, the dried root is usually in longitudinal or transverse slices, of a yellowish gray colour, an aromatic slightly camphoraceous odour, and a warm, aromatic and bitter taste. The medical virtues are imparted both to alcohol and water. The root has been analyzed by different chemists, and found to contain, amongst other constituents, a peculiar aromatic principle—to which the names *Helenin* and *Elecampane Camphor* have been given; resin, the taste of which is bitter, nauseous and acrid; an amylaceous substance termed *Inulin* and *Alantin;* and bitter extractive.

From this analysis it can be understood that Inula possesses the medical virtues of the aromatic tonics; but it is rarely used except as an excitant expectorant in pulmonary catarrh, and bronchitic affections, in which there is no febrile or inflammatory excitement. It has had some reputation as an emmenagogue, but has outlived it. It may, like other aromatic tonics, act indirectly in asthenic cases of amenorrhœa. The decoction is the form commonly prescribed (*Inul.* ℥ss; *Aquæ* Oj.—Dose, f. ℥i. to f. ℥ij.)

II. *Demulcent Expectorants.*

15. ACA'CIA.—GUM ARABIC.

Gum Arabic is the concrete juice of *Aca'cia vera*, and other species of Acacia: Sex. Syst. Polygamia Monœcia; Nat. Ord. Leguminosæ. The species of Acacia, which yield considerable quantities of gum, besides the *Acacia vera*, a native of Arabia and of Africa from Senegal to Egypt, are the *Aca'cia Arab'ica*, a native of Senegal, Egypt, Arabia and India; the *A. Karoo*, indigenous at the Cape of Good Hope; the *A. gummif'era*, native of Arabia and of Africa, near Mogadore;—the *A. Seyal*, native of Egypt and Senegambia; the *A. tor'tilis*, and *A. Ehrenbergii*, natives of Arabia; and the *A. Senegal*, native of Arabia, and Africa from Senegal to the Cape of Good Hope.

The gum generally exudes from the Acaciæ spontaneously, and concretes on the trunk and branches. At times, however, incisions are made to facilitate its flow. It commonly exudes soon after the rainy season has softened the bark, and made it liable to split during the succeeding hot weather. It is exported to this country from the Levant, or some of the other parts of the Mediterranean; from Barbary and Senegal, and from the East Indies, Cape of Good Hope, &c. Duty was paid, in 1839, on the following quantities imported into England. (*Pereira*).

Gum from the East Indies, - - - -	7,869 cwts.
Senegal Gum, - - - - - -	24,698
Other sorts of Gum, - - - - -	7,759
Total,	40,326

The best gum arabic, often termed *Turkey gum*, is in rounded, or amorphous pieces;—some of them transparent; others more or less opaque, with deep cracks extending through them. It is usually of a white or yellowish-white colour. The powder into which it is readily reduced is generally almost pure white. It is inodorous, and has a very feeble taste. Its specific gravity varies from 1.316 to 1.482. It is wholly soluble in water, forming a *mucilage*, which is an officinal preparation. It is insoluble in alcohol, which throws it down from its aqueous solution.

These are the main qualities of the officinal gum arabic. It is apt, however, to be mixed with other varieties of gum, which are described by the different writers on pharmacology, (*Pereira, Christison, Wood & Bache*, &c.) but which demand no detailed account here;—for example; 1. The Barbary or Morocco Gum, supposed to be the produce of *Acacia gummifera*, which is imperfectly soluble in water: 2. Gum Senegal, obtained from several species of acacia, which is by no means as easily pulverizable as the best gum arabic: 3. East India Gum, some of which resembles the best gum arabic; but others are far more difficult to pulverize; and 4. the Cape Gum, which is of a very inferior kind.

Gum arabic has been subjected to analysis by Guérin, and found to consist of 79.40 per cent. of pure gummy principle, to which the name *Arabin* has been given, and which is wholly soluble; of 17.60 per cent. of water, and 3.00 of ashes. It contains no *Bassorin* or insoluble gum, which exists in such large quantities in Gum Bassora, supposed to be the concrete juice of a *mesembryanthemum.*

The essential action of gum arabic is that of a demulcent to the surfaces with which it comes in contact,—soothing the top of the larynx in catarrhal affections, and the soothing influence being extended downwards along the trachea and bronchia by continuous sympathy. It is sometimes taken into the mouth in those affections and permitted to dissolve slowly, and is the basis of certain lozenges, which have attained celebrity for relieving cough, and facilitating expectoration. It is a valuable agent in many cough mixtures into which fixed oil enters—not simply as a demulcent expectorant, but to suspend the oil in water, and form it into an emulsion.

The dose of powdered gum arabic has been stated at from ʒss. to ʒj; but it is obviously an article whose dose can scarcely be fixed. It is taken *ad libitum.*

MUCILA'GO ACA'CIÆ, MUCILAGE OF GUM ARABIC. (*Acaciæ,* in pulv. ℥iv. *Aquæ bullientis* Oss.) It forms part of many mixtures for relieving cough; but is chiefly used as a vehicle to render other substances miscible with water.

16. ALTHÆ'A.—MARSHMALLOW.

Marshmallow is the root of *Althæ'a officina'lis,* Sex. Syst. Monadelphia Polyandria; Nat. Ord. Malvaceæ; an herbaceous perennial, which is indigenous in this country as well as in Europe, growing on the borders of marshes, and especially of salt marshes. The roots are collected in autumn; but those that are met with in the shops are chiefly obtained from Europe. They are generally deprived of epidermis, and are of a white colour, cylindrical shape, and of about the thickness of the little finger. Their odour is feeble; taste sweet and mucilaginous. They are light, woolly externally, and composed of delicate silky fibres.

When chemically examined, it is found to contain a little fecula or starch; nearly 20 per cent. of mucilage; some uncrystallizable sugar; and a crystallizable principle, identical with the *asparagin* of asparagus,—besides other less important constituents.

The virtues of marshmallow are similar to those of gum arabic, and it has been employed in the same cases, especially on the continent of Europe. The *Pâte de Guimauve* or *Marshmallow Paste* or *Lozenge* is a favourite remedy in France in hoarseness, and catarrhal affections in general.

There is no officinal preparation of the althæa in the Pharmacopœia of the United States: a *Decoction* is officinal in the Edinburgh and Dublin Pharmacopœias, and a *Syrup* in all the British Pharmacopœias.

17. AMYG'DALA.—ALMONDS.

The Pharmacopœia of the United States, as well as those of Great Britain and elsewhere, admit both the bitter and the sweet almonds as officinal,—the former being the kernels of the fruit of *Amyg'dalus commu'nis*,—variety *amara;* and the latter of *Amyg'dalus commu'nis*,—variety *dulcis;*—a tree in Sex. Syst. Icosandria Monogynia; Nat. Ord. Rosaceæ (*Jussieu*),—Tribe, Amygdaleæ, which is indigenous in Barbary and Syria, and is cultivated in the southern parts of Europe, whence it has been introduced into this country, but without any advantage, except as an ornament. The general opinion is, that both varieties of almonds are furnished by a tree of the same species; some botanists, however, believe that they are produced by distinct species, and Nies von Esenbeck states, that he had been informed on good authority, that in the Palatinate bitter almonds are not unfrequently gathered from the sweet almond tree. (*Christison.*)

The almond is so well known as not to require a description. Sweet Almonds are imported from Spain and the south of France. The Jordan almonds, which are best, come from Malaga; other varieties are the Valentia, the Barbary, and the Italian. (*Busby.*) The bitter almonds are brought chiefly from Mogadore. One variety only is known in commerce. Both sorts, when triturated with water, furnish a copious white emulsion.

The composition of the sweet and bitter almond is interesting to the chemist; but not much so to the therapeutist. The sweet almond contains about 54 per cent. of a bland fixed oil—the Oleum Amygdalæ,—24 per cent. of a variety of soluble vegetable albumen, termed *emulsin* or *synaptase*, which is the principle that suspends the oil in almond emulsion; sugar, gum, moisture and teguments. The bitter almond contains rather less fixed oil and more synaptase, and has, besides, a peculiar principle, called *Amygdalin*, which is interesting in its chemical, but not in any therapeutical, relation. It contains, moreover, the elements of a bitter volatile oil, which does not exist in the bitter almond, but is speedily developed, when water comes in contact with it. It has been found, that when bitter almonds are deprived of their amygdalin, they are incapable of yielding volatile oil; hence it has been inferred, that water acts upon this principle and generates the evil. Yet amygdalin and water produce no oil, unless emulsion or synaptase be likewise present. Certain it is, that bitter almonds yield no volatile oil on pressure, which ought to be the case did it exist in them, as the volatile oil is soluble in the fixed oil; nor do they yield oil to alcohol or ether. This oil is highly poisonous, and contains hydrocyanic acid, for which—as elsewhere shown—certain preparations from the bitter almond are occasionally used as substitutes.

Both varieties of almonds are demulcents by virtue of the oil they contain, and it has been conceived, that the volatile oil, developed by the combination of water, amygdalin and emulsin, may communicate to the emulsion of bitter almonds virtues similar to those of hydrocyanic acid, and not possessed by the emulsion of sweet almonds;—and hence, that the former may be adapted for cases in which a demulcent expectorant is needed equally with hydrocyanic acid. Often, however, the bitter almond, in pharmaceutical, as in culinary preparations, is employed solely to communicate an agreeable flavour to the compound.

MISTURA AMYGDALÆ, ALMOND MIXTURE. (*Amygdal. dulc.* ℥ss; *Acaciæ* pulv. ʒss; *Sacchar.* ʒij; *Aquæ destillat.* f. ℥viij.) Almond mixture is an elegant demulcent expectorant, much prescribed for allaying cough in catarrhal affections, under the name of *almond emulsion* and *almond milk*. It is a good vehicle for the administration of other agents, as laudanum, paregoric, antimonial wine, &c. It may be taken almost *ad libitum;* but the ordinary dose is from. f. ℥j. to f. ℥iij.

SYRUPUS AMYGDALÆ, SYRUP OF ALMONDS. (*Amygdal. dulc.* ℔j; *Amygdal. amar.* ℥iv; *Aquæ,* Oiij; *Sacchar.* ℔vj.) This is the *syrup of orgeat*, which has been introduced from the French *Codex* into the last edition of the Pharmacopœia of the United States. It may be used in the same cases as the almond emulsion, and is an agreeable drink in sickness.

18. OLEUM AMYGDALÆ.—OIL OF ALMONDS.

Almond oil is the fixed oil of the kernels of *Amyg'dalus commu'nis.* (p. 236.) It is obtained by expression from either bitter or sweet almonds, but more commonly from the former, on account of their cheapness, as well as the greater value of their residuary cake. (*Pereira.*) The average produce is from 48 to 50 lbs. from one cwt. of almonds. From what has been elsewhere said, it will be obvious, that in the case of bitter almonds, the contact of water must be avoided. As met with in the shops, oil of almonds is transparent and without colour, or of a slightly yellow tinge; nearly inodorous, and of a bland, oleaginous taste. It is soluble in ether, and in six parts of boiling, or twenty-five parts of cold alcohol. Its density varies from .917 to .920. The cake, left after the expression of the oil, when ground, forms *Almond powder*, which is used for keeping the skin of the hands soft.

Almond oil is sometimes prescribed in the form of the common oleaginous mixture, in cases of catarrh, as a demulcent expectorant. (*Olei amygdal.* ʒiij; *Mucilag. acaciæ; Syrup.* āā ℥ss; *Aquæ*, ℥ivss. M. Dose, a tablespoonful, when the cough is troublesome.) To this mixture may be added sulphate, acetate, or muriate of morphia, or *Tinctura opii camphorata*, &c., according to the indications. An emulsion might also be made by the substitution of alkalis, or of the yolk of egg for the mucilage; but neither is so agreeable.

Formerly, equal parts of *syrup of violets* or *syrup of roses*, and *almond oil*, was a favourite laxative mixture for infants, and it has been used likewise in the catarrhal affections of that age—*simple syrup* being substituted for either of the syrups mentioned. Formerly, too, almond oil was more frequently employed than at present in the formation of linctuses to allay cough. Of these, the following is a form: ℞.—*Confect. Rosæ canin.* ℥j; *Syrup Papaveris; Ol. amygdal.* āā ℥ss. M. Dose, a tea-spoonful or two when the cough is troublesome.) These linctuses are rarely employed, at the present day, in this country.

19. O'LEUM OLI'VÆ.—OLIVE OIL.

Olive oil is the expressed oil of the fruit of *O'lea Europæ'a, European olive;* Sex. Syst. Decandria Monogynia; Nat. Ord. Oleaceæ; a tree which is supposed to have been originally from Asia, but has been cultivated, so far as history extends back, in the south of Europe.

The finest olive oil is obtained from ripe olives, by crushing them immediately in a mill, and subjecting the pulp or pericarp to gentle pressure. By augmenting the pressure, a somewhat inferior—but still good—article is obtained. An inferior kind, again, is got by pouring boiling water on the residuum, to dissolve its mucilage, and subjecting it again to gentle pressure; and still stronger pressure forces out a turbid, impure oil, which is fit only for the soap-maker. An inferior oil is likewise obtained by allowing the olives to ferment for some days before they are subjected to pressure.

The most esteemed oil is that made in Aix, and termed PROVENCE OIL. FLORENCE OIL or SALAD OIL is a fine kind, imported from Leghorn in flasks. GENOA OIL is likewise a fine variety. The GALLIPOLI OIL, SICILY OIL and SPANISH OIL, are inferior varieties; the last being the worst of all. (*McCulloch, Pereira.*)

The quantity of olive oil consumed is very great. In the year 1839, duty was paid on 12,374 tons. It is an article so well known as not to need any description. When good, it is almost devoid of smell, and has a bland, slightly sweet taste. Its density at 77° Fahr. is about 0.911. It is soluble in one and a half times its weight of ether, and very slightly soluble in alcohol. By exposure to air, it readily becomes rancid, but more slowly than other fixed oils.

It is said to be much subject to adulteration with poppy-seed oil, rapeseed oil, and other cheap oils; but as these oils congeal less readily than olive oil, the adulteration may be detected by reducing the temperature to the freezing point; or, the test suggested by Poutet, and adopted by the Edinburgh Pharmacopœia, may be used. When pure olive oil is mixed with a solution of mercury in nitric acid, prepared by heat, the whole becomes, in a few hours, a firm fatty mass, from the action of the hyponitrous acid in the solution. But if even so small a quantity as 5 per cent. of any other oil be present, the consolidation is much more firm and more tardy; and if the proportion amounts to 12 per cent., the foreign oil floats on the surface of a pulpy mass, for several days before showing any tendency to concrete. (*Christison.*)

As a demulcent expectorant, olive oil is used in the same cases, and form of preparation, as almond oil.

20. CETA'CEUM.—SPERMACETI.

Spermaceti is a peculiar concrete substance, approaching in character the concrete fixed oils or fats, which is obtained from *Physe'ter Macroceph'alus*, or great-headed *Cachalot* or *spermaceti whale*, order Cetacea, which inhabits the Pacific ocean, and the Indian and Chinese seas. It is found in various parts of the animal's body, being dissolved in small proportion in the blubber. The head, however, contains that which we meet with in commerce. It is mixed with oil, in a large cavity in the upper jaw, anterior to, and quite distinct from, the cavity that holds the brain. There are two places in the head, which contain it, between which the nostrils pass; and both cavities are divided into numerous cells, which are filled with a milky fluid, amounting, in a large whale, to about 50 cwt. The contents of these cavities are removed by buckets, and boiled, to separate the oleaginous, from the solid, matter. In this fluid, the spermaceti crystallizes as it cools, and is separated in an impure state by draining off the oil, and subjecting what remains to strong pressure. The crude spermaceti is purified by melting it in water, and skimming off the impurities. It is then melted in a weak solution of potassa, and finally melted a third time by a gentle heat, after which it is solidified in proper moulds, when it forms the spermaceti of the shops. It generally contains a small portion of oil, which may be removed by boiling in alcohol. The spermaceti, then called *cetin*, is absolutely pure.

The spermaceti of the shops, is a white concrete substance, of a foliaceous texture, without taste, and almost without smell. It may be readily reduced to powder, by the addition of a few drops of rectified spirit. It is insoluble in water; slightly soluble in cold alcohol, but much so when the alcohol is at the boiling temperature. It is greatly soluble in ether, and readily so in the oils—fixed or volatile.

Spermaceti possesses the demulcent properties of the bland fixed oils, but it is rarely given internally. When this is desired, it may be made into an emulsion with *yolk of egg*, or *mucilage*, the spermaceti being first pulverized by the addition of a few drops of alcohol.

21. SAC'CHARUM.—SUGAR.

This, in the Pharmacopœia of the United States (1842), is the officinal name for the sugar of *Sac'charum officina'rum* or *Sugar cane*, refined.

Saccharum officinarum; Sex. Syst. Triandria Digynia; Nat. Ord. Gramineæ, is cultivated in the tropical regions of both the old and new world. Its native country cannot now be discovered, but it is supposed to have come originally from the East, (*Christison.*) It is the expressed juice of the ripe canes, clarified and allowed to crystallize or grain. The sugar, when put in casks and allowed to drain, forms Muscavado, brown, or raw sugar; and the uncrystallized portion is molasses. Six pounds of juice, in the East Indies, and eight pounds, in the West Indies, yield one pound of raw sugar. (*Christison.*)

Raw sugar contains various impurities, from which it can be purified;—by elutriation with a little water, solution in water heated by steam, clarification with blood and alumina, filtration through animal charcoal, concentration in *vacuo* at 150°, crystallization, and displacement of the impure syrup in the crystalline mass by passing pure syrup through it. (*Howard*, cited by *Christison*.) The product is WHITE SUGAR, REFINED SUGAR, or LOAF SUGAR—SACCHARUM of the Pharmacopœia of the United States—of which 79 per cent. may be obtained from good Muscavado sugar. The uncrystallizable syrup in this process is TREACLE or SUGAR-HOUSE MOLASSES.

It is not necessary to describe further the processes for forming various kinds of sugar, or to dwell upon its properties. It may be well, however, to remark, that by the slow evaporation of a solution of sugar in water, a crystalline product is obtained, called SUGAR CANDY. BARLEY SUGAR is obtained by evaporating syrup to a state of great concentration, taking care not to empyreumatize it, and then allowing it to cool. TAFFY is made by evaporating a mixture of sugar and butter; and CANDY by boiling syrup or molasses for a few minutes, with the addition of a little butter to prevent it from burning, and flavouring with lemon, peppermint, &c., should this be desired.

Sugar is very soluble in water, and its saturated solution, called SYRUP, is an officinal preparation. It is also soluble in alcohol, but not in ether.

In the United States, from 70,000 to 80,000 tons of sugar are consumed annually. (*McCulloch.*)

Sugar is one of the best of the demulcent expectorants, and forms a part of most cough mixtures on that account. In the form of candies, lozenges, &c., it is much used in cases of tickling cough. A mixture of syrup and olive oil, in equal portions, is a common prescription in the catarrhal affections of infants; and the various officinal syrups that are used as expectorants, as *Syrupus*, *Syrupus allii*, *Syrupus amygdalæ*, *Syrupus scillæ*, *S. scillæ compositus*, *S. senegæ*, and *S. tolutani*, owe a part of their efficacy to their saccharine constituent.

SYRUPUS, SYRUP. (*Sacchar.* ℔iiss; *Aquæ*, Oj.) SIMPLE SYRUP is rarely used alone as a demulcent expectorant, but it forms part of many mixtures that are prescribed for allaying cough.

22. GLYCYRRHI'ZA.—LIQUORICE ROOT.

Liquorice Root is the root of *Glycyrrhi'za glabra* or *Common Liquorice;* SEX. SYST. Diadelphia Decandria; NAT. ORD.

Leguminosæ; a perennial herbaceous plant, which is indigenous in the south of Europe, and is cultivated at Mitcham, in Surrey, England, and at other places, for medicinal use. Much of the root, which is imported into this country, is said to come from the ports of Messina and Palermo in Sicily. (*Wood & Bache.*)

Liquorice Root or *Stick Liquorice* of the shops, is in long cylindrical pieces of varied thickness, from a few lines to more than an inch; of a grayish-brown colour externally, and yellow internally. It has little or no odour, but a remarkably sweet taste, with a slight degree of acrimony. Its main chemical constituents are *Glycyrrhizin*, *Glycion* or *Liquorice Sugar*, which belongs to the uncrystallizable sugars, that are not susceptible of vinous fermentation; and a resinous oil, to which it owes the slight degree of acrimony, which it possesses. The acridity seems to be seated in the epidermis, so that, for medical use, the epidermis should be removed.

The active principle of liquorice root is soluble in water.

Liquorice root is one of the most agreeable demulcent expectorants, and is generally given in the form of decoction, either alone or combined with other demulcents. It is not often, however, prescribed by the practitioner, and as a domestic remedy is more used in the form of the extract. It enters into the composition of *Confectio Sennæ*, *Decoctum Sarsaparillæ Compositum*, *Infusum Lini*, *Pilulæ Hydrargyri*, and *Syrupus Sarsaparillæ Compositus* of the Pharmacopœia of the United States.

EXTRACTUM GLYCYRRHIZÆ, EXTRACT OF LIQUORICE. *Liquorice Juice*, *Spanish Juice*, *Italian Juice*, *Black Sugar*, is amongst the preparations in the London and Dublin Pharmacopœias; but as it is altogether imported into this country, it has been properly placed in the Materia Medica list of the Pharmacopœia of the United States. It is prepared in the same manner as the ordinary watery extracts, by boiling the root, and evaporating the strained decoction. Spanish juice is said to be prepared in Catalonia from *Glycyrrhiza glabra*; the Italian from *G. echinata.*

About 4,059 cwt. of foreign extract of liquorice paid duty in England in the year 1839. (*Pereira.*)

That which is used in this country is said to be brought from Leghorn and Messina. It comes in cylindrical or flattened rolls, covered with bay leaves, and when good is very black, dry, brittle, and entirely soluble in water. It is rarely, however, wholly pure, as usually met with. Refined liquorice is obtained by dissolving the imported extract in water, filtering the solution, and evaporating. The Pontefract or Pomfret Lozenges are made of refined liquorice.

Extract of liquorice is taken into the mouth, and allowed to dissolve slowly as a demulcent expectorant in cough.

TROCHIS'CI GLYCYRRHI'ZÆ ET O'PII, TROCHES OF LIQUORICE AND OPIUM. (*Opii*, in pulv. ℥ss; *Glycyrrhiz.* in pulv., *Sacchar.* in pulv., *Acaciæ*, in pulv. āā ℥x; *Ol. Anisi*, f. ʒij.) These lozenges combine the demulcent virtues of liquorice, sugar, and gum arabic, and the anodyne properties of opium. They are, consequently, well adapted to allay cough, where opium is admissible. Each lozenge contains about one-seventh of a grain of opium.

A preparation similar to these troches is known in Philadelphia under the name of *Wistar's Cough Lozenges.*

23. LINUM.—FLAXSEED.

Flaxseed, *Linseed* or *Lintseed* is the seed of *Linum usitatis'simum, common flax;* Sex. Syst. Pentandria Pentagynia; Nat. Ord. Lineæ—Linaceæ, (*Lindley*,) an annual plant, extensively cultivated in various parts of the globe, which flowers in June and July, and whose seeds ripen in August. Both the seeds and their expressed oil are officinal. The seeds are oblong, oval, flattened on the sides, with acute edges, pointed at one end, smooth, glossy, brown externally and yellowish-white within; devoid of smell, and of an oily mucilaginous taste. The coat of the seeds is mucilaginous; the nucleus oily. The entire seed yields about a sixth of dry mucilage, and a fifth of oil. *Linseed meal* is the *oil cake*, which remains after the expression of linseed oil, ground to powder. It abounds in mucilage, and is extensively used in the formation of poultices. For this purpose, it is better than the ground seeds, which contain oil, and are liable to become rancid.

Flaxseed is not given in substance. The most common form of administration as a demulcent expectorant is the

INFU'SUM LINI, INFUSION OF FLAXSEED. (*Lini*, ℥ss; *Glycyrrhiz.* cont. ʒij; *Aquæ bullient.* Oj.) Flaxseed tea is a common domestic remedy in catarrhal affections. The formula given above is officinal in the Pharmacopœia of the United States. It is rendered more palatable by the addition of sliced lemon. The dose may be from f. ℥ij. to f. ℥iv., but it is generally taken *ad libitum.*

24. TRAGACAN'THA.—TRAGACANTH.

Tragacanth or *Gum Tragacanth* or *Gum Dragon* is referred to *Astrag'alus verus* by the Pharmacopœia of the United States

(1842); but it is generally supposed to be the concrete juice of various species of Astragalus; Sex. Syst. Diadelphia Decandria; Nat. Ord. Leguminosæ. The greater part, however, of that which is met with in commerce would seem to belong to *Astrag'alus verus*, a native of Persia. *Astrag'alus Gum'mifer*, of Lebanon; *A. Cre'ticus*, of Mount Ida in Crete, and *A. Strobilif'erus*, of Koordistan, are also said to produce it. It exudes spontaneously from the stems and branches during the summer season, and concretes there. It is imported from Smyrna and other ports of the Levant. The entries of tragacanth for home consumption, in Great Britain, in 1831 and 1832, were at the rate of 45,836 lbs. a year. (*McCulloch.*)

As seen in the shops, it is in small contorted pieces of the most irregular shapes; of a yellowish or yellowish-brown colour; semi-transparent or translucent; hard; tough; devoid of odour and taste; difficult of pulverization, except at a temperature of 100° or 120° Fahr. (*Christison*), or at a freezing temperature, (*Wood & Bache.*) Its specific gravity is 1.384. With cold water as well as hot it forms a mucilage; but a portion only appears to be dissolved; the remainder, after a time, being precipitated. Chemical analysis shows it, indeed, to be composed of common gum, identical with, or, at all events resembling, the *Arabin* of gum arabic, which has been termed *Tragacanthin* or *Adragantin, soluble gum* or *Arabin of tragacanth;* and of *Bassorin* or *insoluble gum of tragacanth;* the former, according to one analysis, constituting 57 per cent.; the latter 43 per cent. Gum tragacanth is wholly insoluble in alcohol. From its property of swelling up in water, and forming a soft adhesive paste, it is much used in the shop of the apothecary for pasting labels, &c.

Dr. Pereira describes two kinds of tragacanth,—Flaky or Smyrna Tragacanth,—that usually found in English commerce, and which occurs in moderately large, broad, thin pieces, marked with arched or concentric elevations; and the Vermiform or Morea Tragacanth, common on the continent of Europe, and occurring in small, twisted, filiform, spiral pieces.

Gum tragacanth possesses the same properties as gum arabic, but it is very rarely employed as a demulcent. It is more commonly used as a means of administering heavy powders by reason of the great viscidity it imparts to water; and in pharmacy in the formation of troches or lozenges. Should it be desired to administer the powder, the dose may be from ʒss. to ʒij. The Pulvis Tragacanthæ Compositus of the London and Edinburgh Pharmacopœias, which consists of *tragacanth, gum arabic, starch,* and *sugar,* is chiefly used as a vehicle for the exhibition of heavy and active powders to children, and is occasionally given as a demulcent.

MUCILA'GO TRAGACAN'THÆ, MUCILAGE OF TRAGACANTH. (*Tragacanth.* ℥i; *Aquæ bullient.* Oj.) This mucilage is rarely given internally. It is chiefly used in pharmacy in the formation of troches or lozenges, as of the *Trochisci ipecacuanhæ, T. magnesiæ,* and *T. menthæ piperitæ* of the Pharmacopœia of the United States.

25. SES'AMUM.—BENNE.

Benne, which is in the secondary list of the Pharmacopœia of the United States, is the leaves of the *Ses'amum Orienta'lē* or *Benne plant;* Sex. Syst. Didynamia Angiospermia; Nat. Ord. Bignoniæ, Pedaliaceæ, (*Lindley,*) an annual plant, which is a native of India, but has been cultivated in various parts of the world, and is supposed to have been introduced from Africa into the southern states, as well as into the West Indies, by the negroes.

The seeds afford, on expression, a fixed oil—**O'LEUM SES'AMI** or *Benne oil*—which is in the secondary list of the Pharmacopœia of the United States. It resembles olive oil in its properties, and is used for the same purposes.

When one or two fresh benne leaves are stirred in about half a pint of cool water, a quantity of gummy matter is imparted to the water, which soon renders it viscid. When the leaves are dried, they may be put into hot water. The mucilage, thus formed, possesses the same properties as the mucilage of gum arabic, and may be used as a demulcent expectorant.

26. SAS'SAFRAS MEDUL'LA.—SASSAFRAS PITH.

The pith of the stems of *Laurus sassafras,*—whose general properties are described under Excitants—is met with in the shops in slender cylindrical pieces, which are very light and spongy; and have a mucilaginous taste with the flavour of sassafras. They contain a large quantity of gummy matter, which is imparted to water, so as to form a mucilaginous solution: this is used whenever mucilages are required internally, and, there fore, as a demulcent expectorant. The mucilage may be made for internal use, by adding a drachm of the *pith* to a pint of *boiling water;* but it is not often prescribed internally. It is most frequently used as a soothing application in ophthalmia.

27. ULMUS.—SLIPPERY ELM BARK.

The inner bark of *Ulmus fulva*, *Slippery elm* or *Red elm;* Sex. Syst. Pentandria Digynia; Nat. Ord. Amentaceæ or Ulmaceæ, abounds in mucilaginous matter, which it readily imparts to water. Slippery elm is indigenous in this country, flourishing in every part of the United States to the north of Carolina, but most so in the western states. The inner bark is found in the shops, freed from the epidermis, in long, nearly flat pieces, which may be reduced to powder by grinding. Its smell is peculiar, but not agreeable; and its taste, when chewed, is mucilaginous.

Slippery elm bark is almost always given in the form of tea or infusion. A mucilage may, however, be made by stirring the powder in hot water.

INFU'SUM ULMI, INFUSION OF SLIPPERY ELM BARK. (*Ulmi.* concis. et contus. ℥j; *Aquæ bullient.* Oj.) This may be taken as a demulcent expectorant in catarrhal affections; but it is not much used.

28. CETRA'RIA.—ICELAND MOSS.

Cetra'ria Islan'dica, *Lichen Islan'dicus* or *Iceland moss;* Sex. Syst. Cryptogamia; Nat. Ord. Lichenes,—Lichenaceæ, (*Lindley,*) is found in the northern latitudes of both continents, and is said to be abundant on the mountains and in the sandy plains of New England. It is imported into England from Hamburg and Gothenburg, and is said to be the produce of Norway and Iceland. In 1839, 15,933 pounds paid duty in England. (*Pereira.*) As met with in the shops, it is of brownish or grayish white colour, has little or no odour, and a bitter, mucilaginous, somewhat astringent taste. The dry plant, steeped in water, absorbs more than its own weight of the fluid. When analyzed by Berzelius, it yielded 44.6 per cent. of starchy matter, *Lichenin,* —3.0 of a peculiar bitter principle, termed *Cetrarin,* and whose medical properties will be considered elsewhere; 7.3 of gum and uncrystallizable sugar; 7 of extractive matter; 36.2 of starchy lignin, besides colouring matter, and various salts.

Cetraria may be deprived of its bitter principle by a double maceration in water, or in water containing $\frac{1}{375}$ part of an alkaline carbonate. If it be then dried and reduced to powder, it forms a nutritive aliment, which is made into bread by the Icelanders and Laplanders, or boiled with milk.

Cetraria has been much used in cases where demulcents in general are indicated, and, therefore, as a demulcent expectorant. It is employed, also, in pulmonary affections with the same view as arrow-root, sago, or tapioca,—as a bland, nutritious article of diet, and it does not seem to possess any advantage over those articles. It has been highly extolled in pulmonary consumption; but it is now universally considered to possess no peculiar properties either in that or any other disease.

The powder is occasionally—but very rarely—given in the dose of from ʒss. to ʒj; and it is sometimes mixed with chocolate, and taken night and morning, for breakfast and supper. The most common form of administration is the

DECOCTUM CETRA'RIÆ, DECOCTION OF ICELAND MOSS. (*Cetrariæ*, ℥ss; *Aquæ*, Oiss. Boil to a pint, and strain forcibly). The bitter principle or cetrarin is contained in this decoction. It thus combines demulcent and tonic virtues. The bitterness may, however, be first extracted—as before remarked—by maceration in water, or in a weak alkaline ley.

The quantity to be taken during the day, as a demulcent and nutrient, is about a pint in divided doses. It is sometimes mixed with milk.

29. CHONDRUS.—IRISH MOSS.

Carrageen, Corigeen or *Irish Moss*, is the *Chondrus crispus, Lichen Carrageen, Fucus crispus, Sphærococ'cus crispus, Ulva crispa*, or *Chondrus polymor'phus;* Sex. Syst. Cryptogamia; Nat. Ord. Algæ—Algaceæ (*Lindley*). It is found in the Atlantic ocean, on the shores of England, Ireland, western France, Spain and Portugal, and as far as the Tropics, and is also said to be a native of the United States. For medicinal and dietetic purposes, it is collected on the coasts of Ireland (especially in Clare), where it is washed, bleached by exposure to the sun, and dried. (*Pereira.*) In Ireland, it is used by the poor as an article of diet.

When Irish moss is green, it resembles Iceland moss; but as met with in the shops, it is dry, crisp, and of a yellowish or dirty white hue, resembling laminæ of horn. It is nearly inodorous, and has a mucilaginous taste. When chewed, it feels like so much cartilage, but by the warmth and moisture of the mouth it soon loses its brittleness. Its main constituent is a vegetable jelly—which exists in it in the proportion of 79.1 per cent., and which has been considered to consist of *Pectin*, in large proportion—and starch (*Feuchtwanger*), but which Dr. Pereira esteems a peculiar principle and calls *Carrageenin.* It contains likewise, 9.5 per cent. of mucus, and traces of salts.

In order to obtain the jelly of the moss, it is cut small, carefully freed from impurities, and boiled with water or milk, if the latter should be desirable, and strained. Von Gräfe obtained from nine ounces of *milk*, boiled with half a drachm of the *moss*, five ounces of jelly; and as much from a drachm and a half of the *moss*, and twelve ounces of *water.* To the jelly thus formed, any dietetic or therapeutical agent may be added.

Irish moss has been recommended under the same circumstances as Iceland moss; and it would appear, that, like it, no more service can be expected from it than from substances that contain a similar principle. Accordingly, few prescribe it with any other view than as a demulcent and nutritious aliment, where such appears to be indicated.

To remove any unpleasant flavour, which the moss may have acquired from impurities, it is advised, that before it is boiled, it should be macerated in water for a few minutes.

CHONDRUS is in the secondary list of the Pharmacopœia of the United States; CETRARIA in the primary; but there is no sufficient reason perhaps to assign the one a more important place than the other.

The Pharmacopœia of the United States contains in its secondary list:

30. VI'OLA, *Violet,*—the herb of *Vi'ola peda'ta.*—SEX. SYST. Pentandria Monogynia; NAT. ORD. Violaceæ,—an indigenous violet, which flowers in May and June. All the violets contain a principle resembling emetia, which has been called *Violine* or *Violia,* and the existence of which in small quantities—it has been supposed—may account for the expectorant properties ascribed to the plant. (*Wood & Bache.*) The author has never known it used.

III. *Nauseant and Emetic Expectorants.*

Of the mode in which nauseants and emetics probably act as expectorants, a brief notice has been taken already (p. 217). It is evident, that all agents which are capable of inducing nausea, followed or not by emesis, may be employed as expectorants; and it is not improbable, that if they be given short of inducing nausea, some action of sedation may be exerted by them, and that, therefore, they may be adapted as sedative expectorants for cases of pulmonary disease in which the organic actions are over excited. This at least may be the case with the TARTRATE of Antimony and Potassa, Ipecacuanha, Lobelia, &c.; but on the other hand, if certain agents, as Squill, be given in a small dose, they act as excitants, and hence it is important, that they should be pushed to an extent but little, if at all, short of inducing nausea.

Of the nauseants, ipecacuanha is most frequently perhaps prescribed as an expectorant, singly, or—what is far more common—in combination with opium; and not unfrequently it is added to demulcent mixtures to aid their expectorant agency. The following form, introduced into the last edition of the Pharmacopœia of the United States, (1842,) is a combination of this kind.

Trochis'ci Ipecacuan'hæ, *Troches of Ipecacuanha.* (*Ipecac.* in pulv. ℥ss; *Sacchar.* in pulv. ℥xiv; *marant.* pulv. ℥iv; *mucilag. tragacanth.* q. s. Each troche to weigh ten grains.) These lozenges are well adapted for inflammatory affections of the lining membrane of the bronchial tubes.

IV.—*Topical Expectorants.—Inhalations.*

a. Excitant Inhalations.

31. BENZO'INUM.—BENZOIN.

Of the virtues of this balsam as an excitant expectorant, mention has already been made (p. 228). At times, it is employed in the way of vapour; but caution is demanded in inhaling it, as it excites coughing, unless largely diluted with atmospheric air. It ought to be inhaled along with the vapour of water, by breaking benzoin into pieces, putting them into a jar, and pouring boiling water over them. In this manner, the acid rises with the vapour and is taken into the lungs. Its action is excitant to the nerves of the lining membrane of the air passages, and through them to the respiratory nerves in general; and it has seemed to have afforded decided relief in asthma depending on some morbid condition approaching to paralysis of the pneumogastric nerves. (*A. T. Thomson.*) It is said to have proved beneficial even in phthisis after the existence of tubercles had been clearly ascertained; but it can only have acted as a palliative, and probably in the manner already described, through its excitant impression on the respiratory nerves; expectoration being thus facilitated, and dyspnœa relieved. MM. Trousseau and Pidoux strongly recommend this mode of employing the balsams in chronic laryngitis, by throwing some of the benzoin or the balsam of Tolu on hot coals. They advise this plan in preference to inhalations of boiling water containing the balsam, inasmuch as the patient can remain without fatigue for whole days in a balsamic atmosphere.

They affirm that chronic catarrh has been removed in this way, which had resisted the internal use of the balsams. None of the balsams are much used in this manner on this side the Atlantic, or in Great Britain.

32. ACE'TUM.—VINEGAR.

Vinegar is the result of what is termed the *acetous fermentation*, and is impure dilute acetic acid. All liquids, that are capable of the vinous fermentation, are capable of the acetous, and can, therefore, afford vinegar: hence it is made from various substances;—in France and Spain from the lighter wines; in Great Britain from malt and malt liquors, and in the United States from cider. For the use of the white lead manufacturer, it is said to have been extensively prepared, of late years, from potatoes. (*Wood & Bache.*)

The difference in the quality of commercial vinegars is very great, some being four times as strong as others. Certain vinegars are, indeed, so weak, as not to be fit for the preparation of the ACETUM DESTILLATUM, and others are so full of impurities, that they can scarcely be used for making certain officinal preparations. It was not without reason, therefore, that the framers of the Pharmacopœia of the United States (1842) gave the following rules for determining its strength and purity. "One fluid ounce is saturated by about thirty-five grains of crystallized bicarbonate of potassa. It affords no precipitate with solution of chloride of barium, and is not coloured by sulpho-hydric acid." The solution of the chloride of barium detects sulphuric acid, if any be present; and the sulpho-hydric acid the presence of metallic matter.

The French vinegars—as a general rule—are better for all purposes than the British. The best qualities imported into Great Britain are from Bordeaux, and are known under the name of CHAMPAGNE VINEGAR, although made from other wines. Two sorts of wine vinegar are met with in commerce, made from wines of a corresponding colour; but that from the red wines may be decolourized by passing it repeatedly through animal charcoal.

In this country—as before remarked—vinegar is generally made from cider that has become sour. This is put into a barrel in a warm place, along with some good vinegar, or mother of vinegar, which acts as a ferment. The vinegar is ready in the course of a few weeks.

The constituents of vinegar are essentially acetic acid, and water; in addition to which it contains colouring matter, gum, starch, sugar, &c. &c., according to the particular substance from which it has been derived.

As a topical expectorant, vinegar is sometimes used, being put into the ordinary inhaler hot, and in a dilute state. In this manner it acts as an excitant to the bronchial nerves, and is of service in the same cases as benzoic acid and other balsams, by facilitating the expectoration of mucus, and other secretions that may have collected in the air passages. It has been of advantage in asthma, and various spasmodic affections of the respiratory system. It has been advised, that distilled vinegar should be employed by preference, as common vinegar is apt to contain sulphuric acid. (*A. T. Thomson.*)

33. ACE'TUM DESTILLA'TUM.—DISTILLED VINEGAR.

This is made by distilling, from eight pints of *vinegar*, seven, and preserving these for use. One fluid ounce of this should be capable of being saturated by about thirty-five grains of crystallized bicarbonate of potassa.

Distilled vinegar is colourless, or of a yellowish hue, and contains, besides acetic acid and water, a little alcohol, acetic ether, and a substance of a mucilaginous character, which, when the acid is saturated by an alkali, causes the solution to be of a reddish or brownish colour. When properly prepared, it has no empyreumatic or other disagreeable taint.

A *diluted acetic acid*, which has the same strength as distilled vinegar, is made by taking the *acetic acid*—**ACIDUM ACETICUM** of the Pharmacopœia of the United States, (1842,)—which is prepared by the action of sulphuric acid on acetate of soda, and diluting it with ten parts of distilled water. This is the **AC'IDUM ACE'TICUM DILU'TUM** or *diluted acetic acid.* Either this preparation or the distilled vinegar may be employed in the way of inhalation.

34. TOLUTA'NUM.—TOLU.

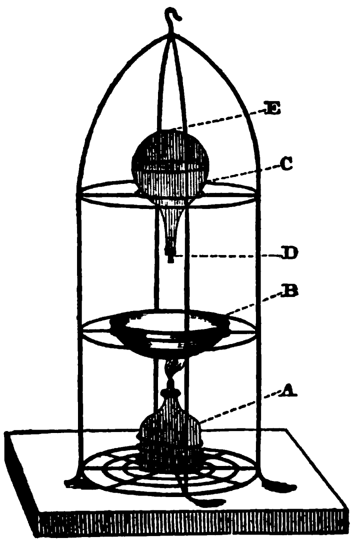
Balsam of Tolu—whose general properties have been already described (p. 225)—may be used as a balsamic fumigation in the same cases, and in the same manner as Benzoin. The air of the patient's chamber may be impregnated with the vapour, by placing a little of it upon live coals, and allowing the vapour to be diffused in the room; or a drachm or two may be put in boiling water, and the vapour be drawn into the lungs by means of an ordinary inhaler.

35. CHLORI'NUM.—CHLORINE.

Undiluted chlorine gas is irrespirable, occasioning spasmodic closure of the glottis, and immediate asphyxia. When largely diluted, it is a powerful irritant to the mucous membrane of the respiratory organs, and may develope inflammation in it or in the tissue of the lungs, unless great caution is taken in administering it. When largely diluted, it may induce a salutary excitant agency, and has hence been employed as a topical expectorant of the excitant class. It has been, indeed, affirmed, that "it is the best topical expectorant and the most salutary excitant to the mucous membrane of the lungs that has yet been inhaled." (*A. T. Thomson.*)

Chlorine has been administered as a remedy in phthisis; and many testimonials have been brought forward in its favour. It has been observed in manufactories in which it is employed, that phthisical patients have experienced decided benefit, (*Gannal, Sir James Murray*); but experiments made with it on an extensive scale in large public institutions have not confirmed these favourable reports; and some writers of distinction have affirmed, that it has been prejudicial. (See the author's *New Remedies*, 3d edit. p. 134. Philad. 1841.) In all cases it has to be employed carefully, and experimentally; but no marked benefit can be expected from it in phthisis. It can only be adapted for cases of disease, in which the pathological condition of the bronchial mucous membrane, or neighbouring parts, requires the exhibition of an excitant. In this way, it may be occasionally serviceable in chronic bronchitis.

It may be obtained by putting f. ʒj. or f. ʒij. of a saturated solution of the gas in water,—the Aqua Chlorini, (*New Remedies*, p. 138)—into an inhaler containing about f. ℥ij of hot water, and placing this in a basin of hot water, or over a lamp, in order to drive off the chlorine. The quantity, thus disengaged, may be inhaled every six hours. Recently, it has been proposed to diffuse it, by means of an appropriate apparatus, in the atmosphere of the sick chamber. For this purpose, any of the acids, as the chlorohydric, may be dropped on a mixture of chloride of lime, so that the chlorine may be disengaged slowly. An apparatus has been suggested, of late years, that answers this purpose well. It consists of a light open wire frame, about 18 inches high; at the bottom of which is a spirit lamp A. At the proper height above it, is an evaporating porcelain dish, about six inches in



diameter, B; and above this is a glass globe C, with its neck downwards. In the neck of the globe is a cork D, bored, and through the opening is drawn, moderately tight, a short plug of cotton wick, such as is used in a spirit lamp. In the glass globe at E, opposite the neck, is drilled a pin-hole, to allow air to pass in, according as the fluid within drops out through the neck. To use it, the porcelain dish is filled with hot water, the spirit lamp is lighted, and as soon as the water in the dish has begun to boil, the glass globe containing the chloride—if this be the substance used—is placed as exhibited in the marginal figure. The rate at which the fluid in the globe shall percolate the cotton wick, and drop into the hot water beneath, is easily regulated. Should it not drop with sufficient rapidity, one or two of the threads of the cotton may be removed; if too rapidly, the cork may be pressed in tightly, or one or more additional threads of wick be introduced.

Eight ounces of a saturated solution of *chlorinated lime* may be poured into the glass globe; and into the water of the porcelain dish two ounces of *dilute sulphuric acid* of the pharmacopœias. As the solution of the chloride drops, the acid seizes on the lime, and chlorine is evolved in connection with aqueous vapour.

In this manner, a sufficient supply of aqueous vapour is given off to prevent any irritation of the lining membrane of the air passages, whilst the invalid experiences neither trouble nor fatigue.

36. IODI'NUM.—IODINE.

The inhalation of iodine has been recommended as an excitant topical expectorant in the same diseases as that of chlorine. In phthisical affections it has been strongly advised. (*Bertin, Sir C. Scudamore, Sir James Murray.*) Sir Charles Scudamore found the addition of a little *tincture of conium* beneficial in subduing the irritating qualities of the gas. This first formula was the following solution of ioduretted iodide of potassium:—*Iodin.* gr. viij; *Potass. Iodid.* gr. iij; *Alcohol,* f. ℥ss; *Aquæ destillat.* f. ℥vss. M. Of this solution, from f. ʒj. to f. ʒvj, and from twenty to thirty-five minims of a saturated tincture of conium were used in each inhalation.) At the temperature of 90°, the volatile properties of iodine are given off very sensibly, but the conium requires more heat, and that of 120° is not too much for the iodine. Sir Charles now advises the following:—(*Iodin. Potass. Iodid.* āā ʒvj; *Aquæ destillat.* f. ℥v. and ʒvj; *Alcohol,* f. ʒij. M.) He now prefers to add the conium at the time of mixing the iodine solution with the water, and recommends that it should be a saturated tincture of the genuine dried leaves. In the commencement of the treatment, he advises very small proportions of the iodine mixture;—for example, from f. ʒss. to f. ʒj. for an inhalation of eight or ten minutes' duration, and this to be repeated two or three times a day: of the tincture he directs f. ʒss—to be increased, if the cough be very troublesome. He soon augments the quantity of the Iodine mixture from f. ʒj. to f. ʒiv, but the feelings of the patient will be a great guide as to the proper strength of the inhaling mixture in any particular case.

The author has often used the iodine inhalation in phthisis, but his experience has not been favourable to it; and the same view has been entertained by others, (*Pereira.*) It would seem to be better adapted for cases of chronic bronchitis.

The inhalation may be practised in the method recommended for chlorine. At times, troublesome laryngeal irritation has been caused by it. Used, however, with the conium, or with aqueous vapour in the apparatus recommended by Dr. Corrigan, (p. 253,) this disagreeable result may be prevented, and, in this way, it has been found to diminish most remarkably the purulent expectoration of phthisis, (*Corrigan.*) It improved the tone of the digestive organs; alleviated the cough, and acted, therefore, as a valuable palliative. Dr. Corrigan has had his apparatus at work from eight to twelve hours in the twenty-four, and his method of managing it is as follows:—At night, when the patient is settling to sleep, the apparatus is suspended from the roof of the bed, and, when once arranged, it continues its work for four or five hours, whilst the patient, asleep, is inhaling the medicated air. In the morning, for three or four hours before the patient rises, it may be again at work; and, if necessary, at midday, whilst he reclines on the bed, with the curtains drawn round three of the sides. The rate of evaporation, which has been generally found to give a sufficiently strong impregnation to the air, is when the tincture of iodine drops from the cotton wick in the globe, at the rate of six or eight drops per minute. At this rate, about six drachms of the tincture will be be evaporated in an hour. (See the author's *New Remedies*, p. 308.)

37. VAPOUR OF BOILING TAR, BURNING WOOL, CREASOTE, &c.

These vapours have been inhaled in cases of phthisis, and in chronic laryngitic and bronchitic affections. In the first disease, no great benefit can be expected from them. In the latter, they may act as excitants to the mucous membrane of the air-passages, and, in certain cases, be beneficial.

Tar vapour was strongly recommended in phthisis by Sir Alexander Crichton; but although it has seemed to act occasionally as a palliative, it not unfrequently occasions a temporary increase of cough and irritation. The tar employed should be that used in the cordage of ships, to every pound of which half an ounce of carbonate of potassa is added, in order to neutralize the pyroligneous acid, which is generally found mixed with the tar, and the presence of which may excite coughing. The tar, thus prepared, is placed over a lamp in a suitable vessel, and kept slowly boiling in the chamber night and day. The vessel ought, however, to be cleaned every twenty-four hours, otherwise the residuum may be burned and decomposed, which occasions irritation. (*Pereira.*)

It is a prevalent idea, that the terebinthinate impregnation of the air which exists in pine regions is beneficial to the consumptive, and, accordingly, patients are frequently sent to spend some time in such localities.

The **Vapour of Resin** has occasionally been used under similar circumstances, as well as the fumes arising from burning wool that has not been dressed. All these vapours are apt to increase the cough at first, but both it and the expectoration would seem to have been ultimately diminished. They must obviously, however, be uncertain agents in all cases, and not easily regulated, and they cannot, of course, produce any material change in the tuberculous condition.

Creasote, like tar vapour, has been occasionally inhaled in the same pulmonary affections:—five, ten or fifteen drops, according to the degree of tolerance of the lungs, being dropped into hot water, in an appropriate vessel, and the vapour being inhaled through the tube of an inverted funnel, or by means of any of the inhalers in use; but the remarks on the value of tar vapour in phthisis, and other pulmonary affections, apply equally to creasote. (*New Remedies*, p. 183.)

b. *Sedative Inhalations.*

38. STRAMONIUM.

Every part of *Datura Stramonium*,—whose general properties are described under Narcotics,—has been smoked for the relief of asthma,—and whilst one part of the plant has, in this form, afforded relief in one case, another has been successful in a second. A case of this kind has been already referred to, (p. 220.) In this form of administration, a poisonous principle is probably developed; for Mr. Morries-Stirling obtained by destructive distillation a poisonous oil, composed of an inert true oil in union with an active principle, probably a modification of *Daturia.* (*Christison.*)

The author has often seen the inhalation of the vapour of stramonium highly beneficial. Its *modus operandi* is probably through the sedative influence exerted by the narcotic principle upon the ramifications of the pneumogastric nerves distributed to the bronchial tubes,—the sedation being thence extended to the rest of the nervous system, so that the spasmodic action is subdued.

Almost all therapeutical writers affirm, that the smoking of stramonium is attended with danger where there is a tendency to encephalic disease, and especially to apoplexy, and where a plethoric state of the system exists; but the author has never witnessed bad effects from it. Of course, caution is needed in the use of this powerful narcotic as in that of tobacco, for similar acronarcotic symptoms may be produced by both.

39. TAB'ACUM.—TOBACCO.

When tobacco,—whose general properties have been described elsewhere, (p. 123,)—is smoked, not only does the nicotia pass into the lungs, but the empyreumatic oil of tobacco, which is an active poison, as formed in the pipe of the smoker, and appears to be nicotia attached to a true volatile oil.

The effect of tobacco, when inhaled, is familiar to most persons, for there are probably few males who have not tested it. It is a powerful sedative, making its impression on the nerves of the bronchial tubes with which it comes in contact, whence the impression irradiates to every part of the system. In this manner it is antispasmodic. It is in spasmodic asthma that its good effects have been most witnessed, but it does not agree with all, and requires caution, especially in those who have not been accustomed to its use. Smoking a cigar is said to have been used in a case of croup with great success. (*Prof. Chapman*, of Philadelphia.)

SECTION III.

AGENTS THAT AFFECT PROMINENTLY THE FOLLICULAR OR GLANDULAR ORGANS.

I. ERRHINES.

SYNON. *Ptarmica, Sternutatoria, Apophlegmatisantia per nares.*

DEFINITION OF ERRHINES — STERNUTATORIES — MODUS OPERANDI — DANGERS OF SNEEZING — SPECIAL ERRHINES.

THIS class of medicinal agents is much less used now than formerly. There are, indeed, but few cases in which their employment can be suggested. At one time *errhines* were separated from *sternutatories*,—the former comprising agents, that excite an increased discharge from the Schneiderian membrane; the latter those that provoke sneezing; but the class of errhines is now made to include both, under the definition—"Agents that occasion an increased discharge from the Schneiderian membrane, and sneezing."

When an irritating substance is placed in contact with the Schneiderian membrane, it excites a sensation, through the fifth pair of nerves, or nerves of general sensibility, distributed to the nose, and by a reflex action the appropriate muscles concerned in sneezing are thrown into contraction, in order that the source of irritation may be ejected by the anterior nares. At the same time, if the errhine remains, for any time, in contact with the membrane, a centre of fluxion is established; the follicles augment their secretion; and, if the substance be still more irritating, true inflammation is excited. This effect, of course, takes place more immediately in the part of the mucous membrane with which the errhine comes in contact; but the excitation is extended more or less to the mucous membranes, which may be regarded as continuous with that which lines the nasal passages —for example, those that line the sinuses and ductus ad nasum. In this way it can be understood, that the operation of an errhine may augment the secretion of tears, and occasion more or less suffusion of the eyes; and, conversely, that an inflamed state of the conjunctiva may give rise to increased discharge of mucus from the lining membrane of the nasal fossæ and sinuses, and to sternutation. A sense of irritation in the nose, inciting to the operation of clearing the nasal fossæ, is, indeed, a common accompaniment of ophthalmia.

From what has been observed, it is clear, that if an errhine be too strong, instead of increasing the discharge from the Schneiderian membrane, it may arrest even the healthy secretion. This is, indeed, one of the well known first effects of inflammation of any mucous membrane, and it is not until the inflammation has persisted for some time, that the secretions are materially augmented.

To prevent the induction of inflammatory irritation, the more powerful errhines are always weakened by the addition of some inert powder.

Therapeutical Application of Errhines.

A knowledge of the *modus operandi* of this class of medicinal agents at once suggests the cases, in which they might rationally be had recourse to. They occasion a centre of irritation in the part of the membrane, with which they are made to come in contact; a derivation of nervous and vascular action from other parts is thus effected; an increased discharge takes place from the exhalents and follicles of the nasal mucous membrane—although this has probably but little curative agency—and if they excite sternutation, a strong revulsive impression is made.

Possessed of these properties, errhines have been used in *head affections* in general; and especially in *diseases of the eyes* and *ears;* but still, their remedial powers are very limited, and if much sneezing be produced, they may cause more mischief than benefit. It is on this account, that they are rarely administered except in popular practice.

Physiologically, sneezing is set up to clear the nostrils from any source of irritation. It is hence often excited in the way of an external sensation—that is, by some substance impinging on the Schneiderian membrane. But it often occurs, also, as an internal sensation,—that is, produced by some organic change in the mucous membrane itself. Hence, it is a symptom of inflammation of the Schneiderian membrane, as in common cold, and in the catarrh that attends measles.

Dr. A. T. Thomson refers to a case of benefit from sternutation, in which this agency appears to have been prescribed empirically. The result may be borne in mind with advantage, as it may attract attention to a cause of cephalalgia, that might otherwise be unsuspected. A lady was afflicted with violent headache, accompanied by the sensation, well known by the term *stuffing in the head.* Many remedies were proposed, and tried, but ineffectually. A physician was called in, who prescribed snuff as a sternutatory. It produced violent sneezing, and the ejection, from one of the nostrils, of a plug of hardened mucus, nearly an inch long; after which she experienced immediate relief, and, in 24 hours, was perfectly recovered.

From the succussion produced during sneezing, and the compression of the abdominal viscera, it has been advised in popular practice, when torpor of the uterus exists after the extrusion of the fœtus, with the view of exciting that viscus to contraction for the delivery of the secundines; and, at times, it is successful; but an acquaintance with the physiology of sneezing will equally show, that it may occasionally be productive of mischief, by giving rise to increased flow of blood to the head by the arteries, and to impeded return by the veins, and thus produce apoplexy, epistaxis and other head affections. The succussion, too, accompanying it, is evidently improper in pregnancy, and *à fortiori*, where there is tendency to abortion; or, where hernia or aneurismal diseases exist. Conradi esteems errhines to be contra-indicated when any inflammatory condition is present; but this caution is unnecessary, as it could scarcely happen, that they would be had recourse to, at least before remedies had been employed, which were considered proper for the removal of such condition.

It is probably owing to the apparent violence done to the system, that the custom has so long existed, in certain countries more especially, of offering a benediction to any one who sneezes. Amongst the Teutonic nations, some form of salutation is always bestowed on such occasions. Even a professor, whilst addressing his hearers, is compelled to *bow* to the force of custom when any of the class execute this physiological act.

It might be agitated here, whether the habitual use of errhines —as of snuff—be prejudicial; but this is a question, which belongs more to hygiène than to therapeutics, and has accordingly been investigated in another place. (See the author's *Elements of Hygiène*, p. 378, Philad. 1835.)

SPECIAL ERRHINES.

1. VERATRUM ALBUM.—WHITE HELLEBORE.

The powdered rhizoma of *White Hellebore*—whose characters are described elsewhere—is possesssed of very acrid properties when placed in contact with a mucous surface, and acts as a powerful errhine; hence the common name of the root—*Niesswurzel* or "sneezing-root" in Germany, and of the powder —*sneezing powder*, in Great Britain. These properties are dependent upon its active principle *veratria*.

The action of powdered veratrum is so violent, that it requires to be diminished by admixture with some mild powder, as starch, wheaten flour, or liquorice,—at least three or four parts of these powders being required to one of white hellebore powder. Three grains, united with nine grains of starch, snuffed up the nostrils for three evenings in succession, occasion a copious watery discharge from the nostrils, (*A. T. Thomson.*) In certain chronic encephalic affections, and in amaurosis, it has been used with this view, but it is not often prescribed.

2. VERA'TRIA.

Veratria,—the active principle of *veratrum album*,—is a powerful errhine, the smallest appreciable quantity, applied to the Schneiderian membrane, exciting the most violent and repeated sternutation. A very minute quantity of the acetate of veratria, placed in the nostrils of a dog, instantly caused violent sneezing, which continued for a long time. (*Magendie.*)

It has been remarked, that we possess the means of making a certain errhine, always of the same strength, by combining *veratria* with a portion of *starch* sufficient to cover its acrimony; yet it is proper to remark, that it is an article which is frequently adulterated; and it is in this way, that many account for the discordance amongst observers as to its virtues. It is, moreover, so violent at times in its operation, and if the Schneiderian membrane be abraded, so much inconvenience may result from its absorption, that if employed at all as an errhine, it ought to be so with the greatest caution.

3. HYDRAR'GYRI SULPHAS FLAVUS.—YELLOW SULPHATE OF MERCURY.

The yellow sulphate of mercury, described under EMETICS, (p. 126,) possesses strong errhine powers, and has the advantage over some others of always possessing the same degree of strength. It is so violent, however, in its operation, that it requires to be mixed with five or six parts of some farinaceous powder, as starch. A quantity of this compound powder, which contains one grain of the yellow sulphate, usually produces a discharge from the Schneiderian membrane, which may continue for several days. It is said to have been found very useful in ophthalmic affections, and as it possesses no narcotic properties, "there can be no doubt," says a recent writer, (*A. T. Thomson,*) "that it is superior to every other errhine in affections of the head."

4. AS'ARUM EUROPÆ'UM.—ASARABACCA.

The asarum of the British Pharmacopœias is not identical with the asarum of the Pharmacopœia of the United States, the latter being an excitant tonic, and, therefore, not falling under consideration here. The *European asarum*, or *common asarabacca;* SEX. SYST. Dodecandria Monogynia; NAT. ORD. Aristolochiaceæ, is a small herbaceous plant, growing in moist hilly woods in England, as well as in many parts of the European continent. The leaves are officinal in the British Pharmacopœias. They are almost inodorous, but have an acrid, aromatic and bitter taste. The root of the shops is about the size of a goosequill, of a grayish colour, quadrangular, knotted and twisted. It has a smell like that of pepper, and a nauseous bitter, hot, acrid taste; much of its acrimony being lost, however, by drying. The acrid properties of the asarum would seem to be mainly dependent upon liquid volatile oil, and a camphoraceous principle. It contains, moreover, bitter extractive.

Asarabacca is an emetic, but is never used as such. It is only employed as an errhine, and is said to be the basis of *cephalic snuff.* When either the powdered leaves or the root are applied to the Schneiderian membrane, they excite sneezing, an increased secretion of mucus, and may even induce a discharge of blood. The quantity used as an errhine is one or two grains of the root, or three or four of the leaves, in some cases of obstinate cephalalgia, chronic ophthalmia, or toothache.

The Dublin Pharmacopœia has a PULVIS ASARI COMPOSITUS, composed of *asarum*, ℥j; *lavender flowers*, ʒj; which is used in the same cases in the quantity of gr. v. to gr. viij.

5. TAB'ACUM.—TOBACCO.

Tobacco, in the form of snuff, is a well known errhine; not, however, habitually employed with that view, but as one form of inducing pleasurable excitement through its peculiar impression on the olfactory nerves.

In the manufacture of snuff, the tobacco is cut into small pieces; is first fermented by being placed in heaps, and sprinkled with water or a solution of salt—the latter preventing the tobacco from becoming mouldy. The heaps soon become hot, and evolve ammonia. The extent to which this process is permitted to go varies, according to the kind of snuff, from one month to two or three—the latter being the usual period. It is then ground in mills, or powdered with a kind of pestle and mortar. Some of the snuffs—as the *Scotch*, *Irish*, *Welsh* and *Spanish*—are high dried. Others—as the different varieties of *Rappees*—are moist. (*Pereira.*)

Of the effects of the abuse of snuff on the system, the author has treated in another work, (*Elements of Hygiène*, p. 383, Philad. 1835.) In this place it has only to be spoken of as a therapeutical agent. To those who are unaccustomed to its use, it occasions an increased secretion of the nasal mucus and sternutation. Where slight and transient effects of this kind are needed, snuff may be employed, but it is a far less energetic errhine than others in the list.

Besides the errhines mentioned, others have been occasionally employed.

6. EUPHOR'BIUM.—This is the concrete resinous juice of an undetermined species of *Euphor'bia*, which is obtained in Morocco, and exported from Mogadore. It causes obstinate sneezing, discharge of bloody mucus, and great torture, if snuffed up the nostrils; and, therefore, requires to be diluted with some mild, feculaceous powder. It is rarely, however, used, and is not in the lists of the Pharmacopœia of the United States.

7. The root of IRIS FLORENTI'NA, of *Florentine Orris*, SEX. SYST. Triandria Monogynia; NAT. ORD. Iridaceæ. 8. ROSMARI'NUS or *Rosemary*. 9. LAVAN'DULA or *Lavender;* and 10. ORIG'ANUM MAJORA'NA or *Sweet Marjoram;* SEX. SYST. Didynamia Gymnospermia: NAT. ORD. Labiatæ; have been classed amongst the errhines, and may act as such by virtue of the essential oil which they contain; but they are more employed on account of their aromatic properties, as adjuncts to errhines of a more powerful character. Dried lavender flowers are a constituent of the *Pulvis Asari compositus* of the Dublin Pharmacopœia.

II. SIALOGOGUES.

SYNON. *Ptyalogogues, ptyasmagogues, salivants, apophlegmatismi seu apophlegmatisantia per os.*

DEFINITION OF SIALOGOGUES—THEIR EMPLOYMENT LIMITED—MODUS OPERANDI OF SIALOGOGUES—MERCURY AS A SIALOGOGUE—SPECIAL SIALOGOGUES.

SIALOGOGUES are agents, that increase the salivary discharge. The general *modus operandi* of local sialogogues or *masticatories*, is analogous to that of errhines. By their excitant properties, they irritate the lining membrane of the mouth, and the irritation, thus induced, is extended along the ducts to the salivary glands; so that not only is the quantity of fluid exhaled from the mucous membranes increased, but salivation results. In this way, depletion follows their employment, and more or less revulsive effect supervenes, which may act beneficially on parts at a distance labouring under disease. Occasionally, also, they may prove useful, as in cases of paralysis of the muscles of the tongue, by their directly excitant properties. It is obvious, however, that they cannot be of benefit except in local palsy of the organ. Where the origin of the disease is cerebral, little or no advantage can be expected from them.

Therapeutical application of Sialogogues.

The employment of sialogogues must necessarily be extremely limited. They are occasionally used as masticatories in *toothache* and in *head affections*,—precisely, indeed, in the cases that are considered to indicate the use of substances, which excite irritation in, and increased discharge from the lining membrane of the nasal cavities.

By some writers on Therapeutics, mercury has been ranked amongst the sialogogues, and salivation is certainly one of the effects resulting from its administration. It is now, however, generally admitted, that this result is never necessary, and that it is rather to be deplored, inasmuch as the increased discharge exhausts and irritates, without producing any benefit whatever. When this potent article of the materia medica is duly exhibited, it induces a new action, not only in the salivary glands, but in every part of the glandular and follicular, and, perhaps, of the whole secretory system; and as this new action is incompatible with the one that may be already existing, the latter yields. In this point of view, therefore, mercury is a revellent, and is referred to elsewhere. Ptyalism may likewise be induced by various other agents—as by iodine, the preparations of gold, copper, antimony, arsenic, and, it is said, it has followed the employment of castor oil, digitalis and opium. Medicines, which act in this manner, have been termed, *specific* or *remote sialogogues.* (*Pereira.*)

SPECIAL SIALOGOGUES.

1. PYRE'THRUM.—PELLITORY.

The *An'themis Pyre'thrum, Anacyc'lus Pyre'thrum* or *Pellitory of Spain;* SEX. SYST. Syngenesia Polygamia superflua; NAT. ORD. Compositæ, is an inhabitant of Arabia, Syria, and of France, Italy, Germany, and other parts of Europe. The root is the officinal portion; but none of it appears to have been imported into England from the Levant since the year 1836, during which year duty was paid on 420 lbs. (*Pereira.*) It has, indeed, fallen into disuse, and has been placed on the secondary list of the Pharmacopœia of the United States.

The root, as met with in the shops, is in pieces of about the length and thickness of the little finger; of a brown colour externally; mottled with black shining spots; breaking with a resinous fracture, and having a radiated structure internally. It is inodorous; and, when chewed, occasions a peculiar sense of heat, pungency and tingling in the mouth, which continues for some time, and is accompanied by a copious flow of saliva.

Its properties appear to be dependent upon a brown acrid resin, an acrid brown fixed oil, and a yellow acrid oil, which have been termed collectively *Pyrethrin:* as, however, Hagen and Schönwald have obtained from it a scentless volatile oil, possessing the peculiar taste of the root, it has been thought probable, that this is the active principle, and that it adheres forcibly to the resin and fixed oil. (*Christison.*)

Pellitory root is employed almost exclusively as a sialogogue in certain neuralgic affections of the head and face, in palsy of the tongue, and of the muscles of deglutition; and, occasionally, both as a masticatory and in the form of *infusion* in relaxation of the uvula and isthmus faucium. It has been much used as a masticatory in toothache, as well as in the form of tincture. (*Pyrethr., Aquæ,* āā p. i: *Alcohol,* p. v.)

2. MEZE'REUM.—MEZEREON.

Mezereon bark, whose properties are described elsewhere, owes its excitant action to an acrid resin, by virtue of which it is a good masticatory, and has been used as such in cases of toothache;—a small portion of the bark being kept constantly in the mouth, and the saliva being ejected as it is secreted, on account of the injurious effects likely to be induced on the digestive mucous membrane, should it be swallowed. In a case of dysphagia, induced by paralysis of three years' standing, mezereon root was prescribed as a masticatory, and in less than a month the patient recovered the power of deglutition. (*Withering.*)

3. CAL'AMUS.—SWEET FLAG.

The general properties of the rhizoma of *Ac'orus Cal'amus* are described under the head of EXCITANTS. Its medicinal agency is dependent upon volatile oil. When chewed, it produces the ordinary excitant effects of the sialogogues in general, hence it is substituted for tobacco by such as are desirous of discontinuing the use of the latter. It need scarcely be said, however, that the two agents resemble each other only in their operation as local excitants. The calamus is possessed of no narcotic properties. It may be used whenever a masticatory is needed.

4. ARMORA'CIA.—HORSERADISH.

Horseradish is the fresh root of *Cochlea'ria Armora'cia;* SEX. SYST. Tetradynamia Siliculosa; NAT. ORD. Cruciferæ or Brassicaceæ;—a native of western Europe, growing wild on the sides of ditches, and other moist situations, and flowering in June. It is cultivated almost everywhere.

Horseradish root, scraped, is a well-known condiment; has a pungent taste, and exhales a highly penetrating acrid vapour. These properties appear to reside in an exceedingly pungent, acrid, diffusible volatile oil, which is present in small proportion; according to one experimenter (*Duncan*) forming not more than four parts in a thousand; whilst another (*Gutret*) got scarcely a sixth part of that proportion (*Christison*). It is difficult, however, to conceive, that so small a quantity of the acrid principle can produce so much excitation.

The odour of the oil, obtained by distillation without water, is extremely powerful, and like that of horseradish: a single drop is sufficient to impregnate the air of a whole room.

Horseradish has been used as a masticatory in cases of paralysis of the tongue. It powerfully excites the nerves of the lining membrane of the mouth, and, through it, the salivary glands, which augment their secretion. It is by virtue of its excitant agency, that it is serviceable, when made into a *syrup,* in certain cases of aphonia, dysphonia or hoarseness, where the affection is dependent upon want of power in the nerves concerned in phonation, or upon a state of the intrinsic organs of voice, which excitants are capable of benefiting.

5. ZIN'GIBER—GINGER.

The rhizoma of *Zin'giber officina'lē*—which is described elsewhere—when chewed, occasions an increased flow of saliva. It has been used as a masticatory in paralysis of the tongue and of the muscles of deglutition.

6. TAB'ACUM—TOBACCO.

Tobacco is a well-known masticatory and sialogogue; but it differs from the other articles of the class, in possessing peculiar properties by which it acts, when swallowed, on the nervous system, and—as has been seen elsewhere—powerfully depresses the powers of the organism. When used, therefore, simply as a sialogogue, the saliva ought not to be swallowed. Indeed, there are few persons, who have been in the habit of chewing tobacco largely, that can swallow any portion of the juice with impunity.

Tobacco is sometimes chewed to relieve toothache, and a portion of the relief obtained is, doubtless, owing to the action of the narcotic principle. It is not, however, an agent which is easy of management in those who are unaccustomed to it; and they, who are in the habit of chewing it, receive little if any benefit from it. It is properly considered to be contra-indicated in paralysis of the tongue, and of the organs of deglutition. The simply excitant masticatories are to be preferred.

III. DIURETICS.

SYNON. *Uretica.*

DEFINITION OF DIURETICS—THEIR MODUS OPERANDI—MENTAL DIURETICS—THERAPEUTICAL EMPLOYMENT OF DIURETICS—IN DROPSIES—IN VARIOUS CHRONIC DISEASES—SPECIAL DIURETICS.

Diuretics are agents that increase the urinary discharge.

Direct diuretics are such as act immediately and specially on the kidney, so as to increase its secretion, and to these the term is more particularly appropriated. As in other cases, however, it has been extended, so as to include any agency, that may indirectly produce diuresis. Thus, diluents may become diuretics, by increasing the mass of the circulating fluid, and, of consequence, the quantity of urine;—in other words, by occasioning the elimination of that, which has been artificially introduced; and, in the same manner, a cool temperature, by diminishing the amount of the cutaneous and pulmonary depurations, may augment that which is effected by the urinary organs. If, too, any inflammatory condition of the kidneys exists, blood-letting, although it diminishes the amount of circulating fluid, may restore the diminished renal secretion; but it is unnecessary to go into the consideration of the various agencies that may prove indirectly diuretic: they will suggest themselves readily to the pathological inquirer. The object, at present, is to investigate the *modus operandi*, and applicability, of substances, that belong strictly to the class of diuretics;—and which, if injected into the blood in appropriate doses, will seek out the urinary organs, and exert on them their operation;—"in appropriate doses," because many of them,—as cantharides, and turpentine,—if given in too great quantity, may induce nephritis, and hæmaturia, without in any manner augmenting the urinary depuration.

Under ordinary circumstances, it is necessary, that a certain quantity of urea, or its elements should be separated from the blood; otherwise, disease and death may ensue. Accordingly, whenever the urinary secretion is suppressed, in protracted or acute diseases, it is an unfavourable, and, in many cases, a fatal symptom, inasmuch as it exhibits a total revolution in the accomplishment of indispensable functions, and one not likely to admit of restoration. There are, however, anomalous cases on record, in which the urinary depuration has not taken place for years together; and, in the "*Philosophical Transactions*," for 1713, Dr. Richardson gives the case of a youth—seventeen years of age—who had never passed any urine, and yet suffered no inconvenience. (See the author's *Human Physiology*, 4th. edit. ii. 310, Philad. 1841.) Where this has resulted from malformation,—as in the last case,—it may be conceived, that the function might be supplied through some other channel,—knowing, as we do, the surprising instances of a similar kind, met with in certain cases of monstrosity; but it is not so easy for us to comprehend those cases, in which the depuration,—after having been established for a length of time,—has become entirely arrested, and with apparent impunity. Allusion has already been made to the compensation that appears to exist between the two great depurations —urinary and cutaneous. This compensation is such, that if the one be diminished from any cause, the other is proportionably increased; and it is probable, that when the urinary depuration is diminished, some of the principles may pass off by perspiration, as urea has been detected in the fluid of the cutaneous exhalation. Perhaps, too, in those diseases, in which we are in the habit, and with propriety, of regarding suppression of the urinary secretion as a fatal symptom, the mischief arises less from the retention of matters that ought to be evacuated, than from the deranged state of the system—the complete *bouleversement* of functions—which the suppression announces.

Of the different substances, ranked under the head of diuretics, some pass into the mass of blood, and proceed to the kidneys, without experiencing any decomposition; others, on the contrary, undergo changes in the first passages, and it is the result only of such changes, that excites diuresis. To the first class belong—amongst other substances—potassa, dilute mineral acids, nitrate of potassa, the oils of turpentine, juniper, &c. The feaster on garlic and asparagus is reminded, by the odour of the urine, of the kind of vegetable that has ministered to his repast; but these are more properly examples of the separation of the odorous principles in the first passages.

Reference has already been made to the opinion maintained,—that, when acetic acid is united to potassa, as in the acetate of potassa, a separation of the constituents takes place in the stomach, the potassa being set free, and the acetic acid digested,—and it was remarked on that occasion, that as the chlorohydric acid exists, in a state of health, in the gastric secretions, should any such separation take place, the potassa would be laid hold of by this acid, and chloride of potassium be formed, which would enter the circulation unchanged. The same may be said of the potassa, and its alkaline fellows, when united to other vegetable acids. Our knowledge, however, on this point of animal chemistry is not very precise, and many of our ideas are probably inaccurate. This seems to be the case in respect to the bitartrate of potassa, on which Dr. A. T. Thomson has the following remarks, when speaking of it as a diuretic. "Its effects in this respect are explained by Dr. Paris on the probability of the decomposition of the salt in *transitû;* and consequently the conveyance of the alkaline base to the kidneys. It is possible, that this explanation may be correct; but when we consider that the quantity of alkali contained in the dose of the bitartrate is equal only to five grains, when a scruple of the bitartrate is taken, and that seven grains of the alkali are taken when twenty minims of the liquor potassæ are administered, yet that the effects of the bitartrate are much more considerable in producing diuresis than the liquor potassæ, there is some difficulty in assenting to the accuracy of this explanation." The comments previously made regarding the salts formed by a combination of a vegetable acid with an alkaline base, apply to this salt; and, if any decomposition be effected, it must probably be in part through the agency of the mineral acid, which is always contained in the gastric juice. In the mode and quantity, however, in which the bitartrate of potassa is usually taken as a diuretic,—that is, in solution, in the way of common drink,—a portion probably escapes any kind of decomposition, and passes to the kidneys unchanged. In the state of solution, it is eminently adapted for ready absorption, and therefore is enabled to pass through the coats of the blood-vessels of the stomach and duodenum, by imbibition,—in the way in which tenuous fluids in general readily enter the circulation.

Of the diuretics, which are set free in the stomach,—or, in other words, are separated there from the substances with which they are combined,—we have marked examples in the vegetable substances, whose diuretic properties are dependent upon oil or oleo-resin;—as the different turpentines, copaiba, cubebs, juniper berries, &c. Even where essential oil is combined with resin, it is not certain, that the resin is not separated from the oil by the digestive process, whilst the latter only is taken into the circulation, and proceeds to the kidney, to excite its appropriate impression. In the case, indeed, of every vegetable, a separation must take place in the stomach between the diuretic and the rest of its components; and the same applies to the only animal diuretic in the lists—the *cantharis* or *blistering fly*,—the active principle of which—*cantharidin*—is separated during the digestive process, and probably alone enters the circulation, and proceeds to the urinary organs.

Lastly, certain mental emotions may be regarded as diuretics: these are of the same character as the mental cathartics. Fear and anxiety of mind are well known agents. Dr. Thomson remarks, that various sounds and even odours operate in the same manner through the medium of the nerves, and refers to Shakespeare, who ascribes this effect to the sound of the bagpipe—

> "And others, when the bagpipe sings i'the nose,
> Cannot contain their urine."

But these are cases, which exhibit the influence of sensations and emotions on the power of retention rather than on that of secretion. The like result, too, is produced by the exciting emotions. Excessive joy has given rise to the same incontinence as excessive dread; a fact, well elucidated by Cervantes, in the effect, which he describes to have been produced on Sancho's daughter, when the joyful tidings were communicated to her, that her father had been made governor of Barataria!

By occasioning a copious discharge of the more fluid portions of the blood, diuretics are, to a certain extent, evacuants, but they are rarely employed as such, unless for the purpose of occasioning greater activity of absorption, as in cases where an undue exhalation or accumulation of fluid has taken place into one or more of the serous cavities. In other words, diuretics are rarely employed as depletives, where antiphlogistics are indicated. Their effect is too trivial to make any decided impression.

It is perhaps by their revulsive action, combined with the diuresis, that they are beneficial in certain diseases. The diuresis itself is a sufficient evidence of their operation as local excitants, even were we not aware, that nephritis, or hæmaturia, or both, frequently result from their administration in too large a dose,—a fact, which it is important to bear in mind in affections of the kidney, accompanied by inflammation, and diminished urinary secretion, in which, from an attention to the latter circumstance only, their employment might seem to be clearly indicated. In such affections, they could not fail to add to the mischief, and the best diuretics would obviously be—the lancet and the antiphlogistic medication, which, by removing the pathological cause of the diminished secretion, would give indirect occasion to its restoration.

Therapeutical Application of Diuretics.

In febrile and inflammatory affections.—From what has been said, then, of the properties of diuretics, their therapeutical employment will be readily intelligible. Much benefit cannot, of course, be expected from them in febrile affections, or in internal inflammations of parts at a distance from the urinary organs; and it would obviously be improper to administer any but simple diluents, where the kidney is suffering under inflammatory irritation. It has been already remarked, that, as simple evacuants, not much reliance can be placed upon them; we have other depletives infinitely more effective in such cases.

In dropsies.—The chief diseases, in which diuretics are prescribed, are those of a dropsical character; especially of the abdomen or cellular membrane. By augmenting the secretion from the kidneys, the quantity of circulating fluid is necessarily diminished; imbibition is augmented; the fluid of the dropsy soaks through the parietes of the blood-vessels, and, in this way, such collections may be made to disappear. It is probable, too, that an essential part of the effect is dependent upon the revulsive operation of the diuretic. Acting as a local excitant to the kidney, it occasions an afflux of vital energy to the organ, and thus diminishes the too great exhalation from the vessels of the serous membrane. Reliance is, however, rarely placed upon the administration of diuretics alone in dropsy. The precise pathological condition, which gives rise to it, has to be attentively investigated, and an appropriate system of medication to be united with the diuretic. Thus, the dropsy is often manifestly of an active or sthenic character, so that blood-letting or cathartics, or both, are indicated, and, these being premised, more benefit may accrue from the diuresis than would otherwise have resulted. Frequently, in such cases, a combination of agents of another character with diuretics may be used with great advantage. Mercury is an excitant of the secretory system; squill is a diuretic; their conjoint action will, therefore, be as follows:—the mercury produces an action of revulsion,—a distraction of vital manifestation from the seat of the dropsical affection to the parts on which it exerts its local stimulation,—the exhalation from the serous membrane is consequently reduced even below the healthy point; a similar influence is exerted by the local stimulation of the diuretic, whilst, in addition, under its operation the absorbed fluid is discharged. Hence, a combination of mercury with digitalis, squill, or some other diuretic, is one of the most useful and most common prescriptions in dropsical cases.

It is obvious, that diuretics can never be productive of essential benefit, where organic mischief exists in any of the viscera. Impeded circulation in the viscera gives occasion to the worst forms of dropsy, as the visceral mischief does not usually admit of remedy. Of this nature is the organic disease of the kidney, to which attention was originally directed by Dr. Bright, in the first volume of his '*Reports*,' and which is distinguished by the coagulable state of the urine—*albuminuria*. This is often accompanied by dropsy, although not always. (See the author's *Practice of Medicine*, ii. 98, Philad. 1842.) In such cases, the author has been very cautious in the administration of excitant diuretics, under the apprehension, that they might add to the irritation already present in the kidneys. It is proper, however, to observe that they have not been regarded by some as contra-indicated in these very cases. Dr. Christison thinks, that a stimulus of one kind may be employed with impunity, and even with advantage, when an organ is labouring under irritation of a different kind; and he affirms, that diuretics do not augment the quantity of albumen in the urine, the amount of which has been generally regarded as an index of the degree of local irritation. He considers the best combination in such dropsical cases, to be—digitalis, a sedative diuretic, with bitartrate of potassa, an excitant diuretic,—the efficacy of the diuretic in such cases being enhanced by the use of an emetic or brisk cathartic.

In *rheumatic affections.*—Diuretics have been frequently recommended in various chronic diseases, especially of a rheumatic nature. In lumbago and sciatica, the oils of the different terebinthinates, as well as the terebinthinates themselves, have been much used, and, at times, with marked advantage; but their *modus operandi*, is probably altogether revellent, not from the diuresis they occasion.

On the whole, therefore, the class of diuretics, although often had recourse to by the practitioner, cannot be considered to comprise our most efficacious agents in the management of disease. They are applicable to but few morbid conditions, and many of these can be as well treated by other remedies. Accordingly, they are by no means as often employed at the present day as they were formerly.

SPECIAL DIURETICS.

These may be divided into two classes. 1. *Excitant Diuretics*, and 2. *Sedative Diuretics;* the *former* clearly acting as excitants to the kidneys, and not, therefore, well adapted when there is any inflammatory condition of those organs; the *latter* acting more, perhaps, upon the organic actions generally, diminishing the power of the heart and arteries, and therefore well adapted for sthenic dropsies. These substances seem to act but slightly on the kidneys as true diuretics, and it has even been objected to ranking digitalis amongst the diuretics,—that its action seems to consist in removing the cause of the dropsy, the fluid being then carried off in the usual manner, so that it is no more a diuretic than quinia, in dropsies caused by intermittents. (*Wöhler* cited by *J. Müller.*) It is probable, however, that not only digitalis, but the other agents, classed as sedative diuretics, are capable of acting directly upon the kidneys so as to increase the secretion from them.

I. *Excitant Diuretics.*

1. JUNIP'ERUS.—JUNIPER.

The excitant properties of juniper are described elsewhere. These are shown to be dependent upon its volatile oil—the **O'LEUM JUNIP'ERI**. The diuretic virtue is dependent upon the same; and according to some experiments, in the dose of four drops, which may be given in sugar, it is one of the most certain of diuretics. A recent writer, (*Christison,*) states, that he has found five minims of the *oil*, mixed with a fluidrachm of *spirit of nitric ether*, given three times a day in any common vehicle, produce diuresis in dropsy, when other means had failed.

The berries, when eaten, affect the urinary organs, increasing the secretion from the kidneys; and, in large doses, producing renal and vesical irritation. The urine acquires a violet odour under their use. They are occasionally given as a diuretic in dropsy, but are rarely trusted to alone. They may be rubbed up with sugar, and taken in the dose of a drachm or two three or four times a day. This, however, is not the form in which they are usually prescribed. The author is constantly in the habit of directing them to be taken in *infusion* as common drink. This may be made by pouring on an ounce of the berries a pint of boiling water, letting it stand till cold, and taking the whole pint in the course of the twenty-four hours. Where the diuretic agency of bitartrate of potassa seems to be indicated, two drachms of it may be added to the juniper berries prior to infusing them.

SPIR'ITUS JUNIP'ERI COMPOS'ITUS, COMPOUND SPIRIT OF JUNIPER. (*Juniper.* contus. ℔j; *carui,* contus., *fœniculi,* contus. āā ℥iss; *alcohol. dilut.* cong.; *aquæ* Oij.)

This spirit, when sweetened, has been regarded as a substitute for *Hollands*, and for *common gin*, both of which contain oil of juniper; and hence *gin toddy*, or hot gin and water, is occasionally prescribed to hydropics as a diuretic. The combination of carraway and fennel seeds adapts it more for an excitant and carminative; but still, on account of the juniper berries, it is most commonly used as an adjunct to diuretic mixtures. It is rarely given alone. Its dose is f. ʒii to f. ʒiv, and both it and the spirituous liquors named above may be of service in highly asthenic cases of dropsy.

3. SCOPA'RIUS.—BROOM.

The fresh tops of *Cyt'isus Scopa'rius, Spar'tium Scopa'rium* or *common broom;* Sex. Syst. Diadelphia Decandria; Nat. Ord. Leguminosæ, are in the secondary list of the Pharmacopœia of the United States, into which they have been admitted on account of their diuretic properties.

Broom,—a shrub from three to six feet high, and flowering in June,—is indigenous in Europe, and cultivated in this country as an ornament to the gardens. The tops have a bitter, nauseous taste; and, when bruised in their fresh state, a strong peculiar odour. The seeds possess similar properties, and their virtues are yielded to both water and alcohol.

Although broom has been placed in the secondary list of the Pharmacopœia of the United States, and is but little prescribed by the physicians in this country, it is highly extolled, and placed in the first rank of the diuretics by some practitioners. Dr. Pereira, for example, affirms, that having very frequently employed it in dropsies, he can add his testimony to its powerful effects as a diuretic, and that he cannot call to mind a single case in which it has failed to act on the kidneys. In some cases, it produced a most marked and beneficial influence on the dropsical effusion, and, in his opinion, it is more certain than any other diuretic in dropsies.

Owing to its bitter principle, it is at the same time tonic; and, consequently, adapted for cases in which the union of a tonic and a diuretic is needed, as in the asthenic forms of dropsy. When given in too large a dose, it acts both as a cathartic and an emetic.

The London Pharmacopœia has an INFUSUM SCOPARII, (*Scopar.* ℥j; *Aquæ bullient* Oj;) the dose of which, as a diuretic, is f. ℥j. to f. ℥ij;—a DECOCTUM SCOPARII COMPOSITUM, (*Scoparii, Juniper., Taraxac.,* āā ℥ss; *Aquæ* Oiss. Boil down to a pint.—Dose, f. ℥j. to f. ℥ij;) which is a combination of diuretics; and the Dublin Pharmacopœia a watery extract prepared from a decoction of the tops—the EXTRACTUM SPARTII SCOPARII—the dose of which is from ʒss. to ʒj; but it is rarely prescribed.

3. SCILLA.—SQUILL.

Squill—which has been described under EMETICS (p. 119)—has long had the reputation of an active diuretic, and as such has been frequently prescribed in dropsical cases, and, at the present day, is perhaps employed as often as any remedy belonging to the class. It is rarely, however, given alone, being combined either with other diuretics—as digitalis, bitartrate of potassa, or juniper berries—or with a revellent, as the mild chloride of mercury. It is an excitant diuretic, and therefore less adapted than digitalis for cases in which there is much vascular excitement, especially of the kidneys. Its dose, in substance, is one grain, repeated every four or five hours. At times, its diuretic influence is not exhibited until it has been pushed so as to induce nausea.

The dose of the **ACETUM SCILLÆ**, (p. 120), as a diuretic, is f. ʒss. to f. ʒj; and of the **TINCTURA SCILLÆ**, (p. 120), from ♏x. to ♏xx.

4. CHIMAPH'ILA.—PIPSISSEWA.

The leaves of *Chimaph'ila umbella'ta, Ch. corymbo'sa, Pyro'la umbella'ta, Pipsis'sewa,* or *umbellated winter green;* SEX. SYST. Decandria Monogynia; NAT. ORD. *Pyrolaceæ,* are officinal in the Pharmacopœia of the United States; and the whole herb in those of Edinburgh and Dublin. It is a beautiful evergreen, and is indigenous in the northern parts of Europe, Asia, and America, flowering in June and July.

The leaves have a bitter sweetish taste, with some degree of astringency. Boiling water and alcohol extract their virtues. When subjected to analysis, they yield bitter extractive, resin, tannin, gum, lignin and saline matters. It is not determined in what principle the main activity resides, but, it has been presumed, in the bitter extractive. The constituents would show, however, that the leaves must be tonic, by reason of the bitter principle; and astringent by reason of the tannic acid. They have, likewise, a decided effect in increasing the secretion of the kidneys; and like marvellous virtues have been assigned to them, as to diosma crenata and uva ursi, in *diseases of the urinary organs in general!* It is in dropsy, however, that the diuretic action of chimaphila has been most frequently serviceable, and it may be beneficially employed wherever a tonico-diuretic is indicated. The author has often used it in atonic dropsy, and with decided advantage.

An extensive series of experiments was made at the Bürger hospital at Pesth in regard to its remedial powers in dropsy. Within two years, nearly 200 cases are said to have been radically cured by it. (See the author's *New Remedies*, 3d edit. p. 129: Philad. 1841.)

Chimaphila is generally given in decoction, but a watery extract is sometimes prepared from it, which may be prescribed in the dose of 20 or 30 grains, three or four times a day.

DECOCTUM CHIMAPHILÆ, DECOCTION OF PIPSISSEWA. (*Chimaphil.* cont. ℥j; *Aquæ,* Oiss. Boil to a pint.) The whole of this may be taken in 24 hours. Where it is desirable to act, at the same time, on the bowels, senna leaves may be added.

5. CAIN'CÆ RADIX.—CAINCA ROOT.

Radix Caincæ, R. Chiococ'cæ, R. Cainanæ, R. Canina'næ, R. Cahin'cæ, R. Kahin'cæ, R. Serpenta'riæ Brazilien'sis or *Cain'ca Root,* is not in the British or American Pharmacopœias. It is the root of *Chiococ'ca anguif'uga;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Rubiaceæ; a shrub, which grows wild in Brazil, where the root is employed against the bites of serpents. It is of the thickness of the finger, round and knotty; the surface is irregularly wrinkled, the wood tough, and of a whitish colour; the smell, especially of the fresh root, is disagreeable, and the taste at first like that of coffee, but afterwards nauseous and pungent. The bark of the root is alone active, the woody portion being inert: its virtues are extracted by water and by alcohol.

Chemical analysis has shown one of its constituents to be a bitter principle, crystallizable in small, white, shining silky needles, which has an acid reaction, owing to the existence of a peculiar acid—the *Cahincic acid*—and in which the medical virtues appear to reside. It was found to contain, likewise, a fatty, green, nauseous odorous substance, which gives the plant its smell; and a yellow, and, also, a viscid colouring matter. (*Pelletier & Caventou.*)

The main therapeutical effect of Cainca is exerted on the digestive and urinary organs. It occasions watery evacuations, and increased secretion of urine. It has been doubted, however, whether its beneficial effects in dropsical cases have not been dependent rather upon its cathartic than its diuretic agency. (*Albers, Wolff.*) The testimony in regard to its action in dropsy has been discordant, but many have deposed very strongly in its favour.

It is given in various forms of preparation—powder, infusion, decoction, tincture, extract, syrup, and wine. The WINE is formed from one ounce of the *powdered root* to a pint of *wine;* the TINCTURE from one part of the *root* to eight parts of *alcohol.* The dose of the powder is from ℈j. to ʒss. in the 24 hours. It appears, however, that it gives rise to disagreeable symptoms more frequently than the other forms.

It is affirmed, that there is a remarkable analogy between cainca and apocynum cannabinum. (See the author's *New Remedies,* 3d edit. p. 106: Philad. 1841.)

6. BALLOTA LANATA.

Ballota Lanata, SEX. SYST. Didynamia Gymnospermia; NAT. ORD. Labiatæ, is a plant which grows exclusively and commonly in Siberia; where it has long had great reputation in dropsy. It has been, of late years, introduced into Russia, Germany and Italy, but has not been employed in this country. The whole plant is used, except the root; and ample testimony exists to show, that it largely increases the urinary secretion, and has produced unequivocally good effects in dropsical cases. The form of preparation usually prescribed, is the DECOCTION. (*Ballot. lanat.* ℥iss;—℥ij; *Aquæ,* Oij; boil to a pint. Dose, a cupful, night and morning.) (*New Remedies,* p. 89.)

7. SPIRITUS ÆTHERIS NITRICI.—SPIRIT OF NITRIC ETHER.

The *Spirit of Nitric Ether, Spiritus Nitri dulcis, Sweet Spirit of Nitre, Nitre Drops*, or—as it is often called—*Nitre*, is a mixture of impure hyponitrous ether and alcohol. According to the process of the Edinburgh Pharmacopœia, it is formed by first preparing nitric or hyponitrous ether, and then diluting this with alcohol. The Pharmacopœia of the United States does not generate the ether by the direct mutual reaction of nitric acid and alcohol; but provides the materials for the formation of the nitric acid, as in the annexed process:—Take of *Nitrate of potassa*, in coarse powder, ℔ij; *Sulphuric acid*, ℔iss; *Alcohol*, nine pints and a half; *Diluted alcohol*, a pint; *Carbonate of potassa*, ℥j: Mix the nitrate of potassa and the alcohol in a large glass retort, and having gradually poured in the acid, digest with a gentle heat for two hours; then raise the heat and distil a gallon. To the distilled liquor add the diluted alcohol and carbonate of potassa, and again distil a gallon.

The redistillation from carbonate of potassa is directed to get rid of some acid, which is always contained in the product of the first distillation. Spirit of nitric ether, thus obtained, has the specific gravity 0.834, is colourless, has a peculiar and fragrant ethereal odour; and a pungent, slightly sweet and acidulous taste. It reddens litmus paper, but does not effervesce with carbonate of soda; by keeping, however, it becomes decidedly acid, and may decompose various substances, with which it is frequently combined in prescriptions. To obviate this, it may be kept on crystals of carbonate of potassa. It is very volatile and, therefore, requires to be kept in well stopped bottles. It dissolves in water and alcohol in all proportions. It is very extensively adulterated, sometimes with three or four times its weight of alcohol and water. Dr. Pereira states, that in July 1840, Mr. Hennell, of Apothecaries' Hall, London, informed him, that it was then selling in the trade at a price, which was but just above that of the duty on the spirit used in manufacturing the genuine article. Wholesale dealers, too, are said to keep two or even three qualities of the preparation. The density and flavour will lead to a tolerably accurate estimate of its goodness.

Spirit of nitric ether decidedly increases the action of the kidneys; yet it is rarely given alone in dropsical cases; and not very often in association. It may be combined with squill, bitartrate of potassa, juniper berries, &c. It must be borne in mind, however, that it is an excitant diuretic, and ought, therefore, to be given with caution in dropsies connected with disease of the kidney. It is best adapted for those of the asthenic kind. Its dose as a diuretic is from f. ʒss. to f. ʒij. in water, repeated two or three times a day.

SALTS OF POTASSA.

8. POTAS'SÆ BITAR'TRAS.—BITARTRATE OF POTASSA.

Bitartrate of potassa, in small doses, is a diuretic, and as such is used in dropsical cases, rarely alone, sometimes combined with other diuretics, as squill, digitalis, juniper berries, &c.; at others, united with cathartics, to which class of medicinal agents it likewise belongs. (See page 185.)

As a diuretic, it may be given in molasses in the dose of a scruple to a drachm, repeated two or three times in the twenty-four hours. This is not, however, so good a form as a solution of the salt, made by pouring a quart of boiling water on half an ounce of the bitartrate, sweetening with sugar, and flavouring or not with lemon-peel. This may be taken freely as common drink, unless it should act too much upon the intestines. The ordinary *imperial* is made by dissolving a drachm or a drachm and a half of the bitartrate in a pint of boiling water, and adding lemon-peel and sugar. A *cream of tartar whey* is made by adding about two drachms of the bitartrate to a pint of milk, which may be diluted with water, and drunk as a diuretic in hydropic affections. It may also be rendered soluble by borax or boracic acid, and be given in this way.

9. POTAS'SÆ NITRAS.—NITRATE OF POTASSA.

Nitrate of Potassa, *Nitre* or *Saltpetre,* occurs in both the inorganic and the organized kingdom. In the former, it is met with in certain soils, efflorescing on the surface; in the latter, it has been found in various plants. For the various modes in which it is obtained from its natural sources, as well as artificially, the reader is referred to chemical works. It is found naturally in various parts of the United States, especially in the southern and western portions, where it occurs, for the most part, in caverns or limestone rock, called *saltpetre caves,* and is associated with nitrate of lime. The earths, contained in these caves, are lixiviated, and yield, according to the impregnation, from one to ten pounds of crude nitre to the bushel. These caves are especially numerous in Kentucky, and are said to have furnished a large portion of the nitre used in the United States during the last war. (*Wood & Bache.*) The greater part of the nitrate of potassa used now in England and in this country, is obtained in various parts of the East Indies by a similar kind of lixiviation.

Crude saltpetre, as met with in commerce, requires to be purified for medicinal purposes. This is done by dissolving it in two parts of hot water, filtering the liquor and setting it aside, so that, on cooling, crystals may form.

Nitrate of potassa is also prepared, in many parts of Europe, from soils artificially impregnated with animal matter, or from the mortar of old buildings, especially of the under-ground floor, or from artificial composts, consisting of animal substances, decaying vegetables, ashes and chalk, marl or lime. The nitrate, thus produced in the first place, is the nitrate of lime, which is converted into nitrate of potassa by the addition of carbonate of potassa.

Nitrate of potassa, as met with in the shops, is tolerably pure. It is in fragments of crystals, of considerable size, which are striated, opaque, colourless, six-sided prisms, terminated by one, two or six converging planes. The crystals are unalterable in the air, and wholly soluble in water. They have a sharp, cooling taste. The salt is occasionally adulterated with sulphate of potassa, and muriate of potassa. The sulphate is detected by a solution of the chloride of barium, which occasions a white precipitate of sulphate of baryta; the muriate, by the nitrate of silver, which produces a white precipitate of chloride of silver.

Nitrate of potassa, besides its other properties, possesses those of a diuretic. It is taken up into the mass of blood, and is separated by the kidneys, so that it may be detected in the urine. It is not often, however, prescribed as a diuretic, in consequence of there being more potent articles of the class. It may be given in the dose of gr. x. to ℨss. dissolved in water, and its action may be facilitated by taking diluents freely.

10. POTAS'SÆ ACE'TAS.—ACETATE OF POTASSA.

Acetate of potassa, which was formerly termed *Sal diuret'icus*, had at one time great reputation for its powers in augmenting the urinary secretion; but it is not now much employed. In large doses—as elsewhere shown, (p. 187,)—it is cathartic; and may produce a joint cathartic and diuretic action. It was highly thought of by Dr. Duncan, jr. in dropsy; and Alibert considered it the best of diuretics in hydrothorax. (*Christison.*) It unquestionably is diuretic in small doses, and may, therefore, be serviceable in dropsies, but it is less efficacious, apparently, than bitartrate of potassa, which has now usurped its place.

An acetate may be made by saturating vinegar with the potassa of the carbonate of potassa.

Acetate of potassa—as before remarked—must undergo decomposition in the stomach, if chlorohydric acid be present, and it is affirmed, that if none should exist there, the potassa alone enters the circulation, and is separated by the kidney. If this explanation be true, the diuretic agency must be ascribed to the potassa, and not to the acetate.

The dose, as a diuretic, is from gr. x. to gr. xx., given in any diluent or demulcent.

11. SALTS OF SODA.

Many of the salts of soda are diuretic, but none of them eminently so. The *Borate*—SODÆ BORAS—has been sometimes given in dropsy, in the dose of ʒss. to ℥j. frequently repeated; the *Carbonate*—SODÆ CAR'BONAS—in the dose of gr. x. to ℥ss; and the *Bicarbonate*—SODÆ BICAR'BONAS—in the dose of gr. x. to ℥j; but they are never trusted to alone, and it is doubtful whether they are worthy of being classed amongst the active diuretics.

12. CAN'THARIS.—SPANISH FLIES.

The Spanish Fly or *Blister Beetle*—CLASS Insecta; ORDER, Coleoptera, is a native of the south of Europe, and also of Germany and Russia; and it has been met with in England. In the summer of 1837, it was abundant in Essex, and Suffolk. It is found on species of Oleaceæ, as the ash, privet, and lilac; and of Caprifoliaceæ—as the elder and Lonicera. (*Pereira*).

It inhabits the earth in the larva state, and appears in the form of fly in May, when it infests the trees and shrubs in such numbers in some of the promenades of southern Europe, as to drive away the visiters. The flies are caught either in the morning or evening, at which time they are less active, by spreading cloths under the trees, which are strongly shaken or beaten with long poles. The collectors are obliged to have both their faces and hands protected. After they have fallen off, they are killed by being exposed to the vapour of vinegar, hot water, spirit of wine, or oil of turpentine; or by immersing the cloths containing them in hot vinegar and water, and then drying them.

At one time, Spain supplied Cantharides largely, whence their name *Spanish Flies;* but at the present day, they are imported partly from Messina, and party from St. Petersburg. They are very abundant in the southern provinces of Russia. The Russian flies are the largest and most esteemed. In the year 1839, duty was paid in England, on 16,376 pounds. (*Pereira.*)

Dried Spanish Flies—as met with in the shops—are from six to ten lines long, and about a grain and a half in weight. Their odour is peculiar and disagreeable; their taste acrid and burning. They should be kept perfectly dry by means of well stopped bottles, and as they are subject to destruction by insects—which devour the vesicating portion with the rest—it may be well to sprinkle them with pyroligneous acid, or with a few drops of strong acetic acid. This last has been found an excellent preservative. (*Pereira.*) When dried, they can be reduced to powder, which has a grayish-brown appearance, with numberless shining green particles. It is in this state, that they are most liable to adulteration. When in the entire state, their goodness is appreciated by their odour, and freedom from mites and other insects. The powder is sometimes adulterated with powdered euphorbium, especially in the formation of the plaster, and Dr. Pereira affirms, that he has been informed by persons well acquainted with the fact, that it is a common practice, amongst certain druggists, to mix one pound of *euphorbium* with fourteen pounds of powdered *Spanish Flies.*

Cantharides have been often analyzed, but the results obtained by Robiquet have received the most attention. He found them to contain, 1. A peculiar principle—*Cantharidin*—procured by concentrating an alcoholic tincture obtained by displacement, and setting it aside, so that the cantharidin may crystallize: the blistering property of cantharides is evident in this. 2. A green fatty oil, soluble in alcohol. 3. A fatty matter insoluble in alcohol. 4. A yellow viscid substance, analogous to osmazome. 5. A black colouring matter. 6. A yellow colouring matter. 7. Free acetic and uric acids; and 8. Phosphate of lime, and phosphate of magnesia. The main active constituent appears to be the cantharidin, and it would seem to exist only in the trunk and soft parts of the body, as the other parts have been found inert or nearly so; yet there would seem to be some volatile odorous matter exhaled from the insects, as irritation is produced by sitting under trees on which they are found, or by breathing the vapour from a decoction of them. The virtues of cantharides are yielded to boiling water; but more readily to acetic acid, alcohol, pure and dilute—ether, and the fixed and volatile oils.

Of the effects of Cantharides, when applied to the cutaneous surface, mention will be made in another place. Taken internally, they are a most violent acrid poison, and have therefore to be prescribed with great caution as a medicinal agent. When given in too large a dose, their effects on the genito-urinary system are exhibited by the ordinary signs of nephritis and cystitis;

and, by the extension of the irritation through contiguous sympathy, priapism, and sometimes satyriasis are induced in the male; and irritation of the sexual organs, and occasionally abortion in the female. When given to this extent, the renal secretion may be diminished or arrested. In a smaller dose, however, they excite the kidneys to increased action; but although always classed amongst diuretics, they are uncertain in their operation, and are really more beneficial as revellents, through the nephritic irritation which they induce; accordingly, they are less prescribed in diseases, which, like dropsy, require an augmentation of the secretory action of the kidneys, than in neuralgic affections, which, like lumbago and sciatica, are best relieved by revellents. It can likewise be understood, that, by virtue of those same excitant properties, they may be beneficial in paralysis of the bladder, and in cases of atony of the genito-urinary organs in general. Should cystitis be induced by them, it must be met by bloodletting, and by the free use of demulcent drinks.

The dose of the powdered flies is one or two grains made into a pill with conserve of roses, or extract of taraxacum, which may be repeated twice a day. The tincture, however, is more frequently employed.

TINCTU'RA CANTHAR'IDIS, TINCTURE OF SPANISH FLIES. (*Cantharid.* contus. ℥j; *alcohol. dilut.* Oij. It may be prepared by simple maceration, or by displacement.) The dose is ♏x to f. ʒj, repeated three or four times a day in some demulcent fluid, as barley water or flaxseed tea.

The external application of cantharides will fall under consideration elsewhere.

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13. CAN'THARIS VITTA'TA.—POTATO FLIES.

Cantharis Vittata, Lytta Vittata or *Potato Fly,* is somewhat smaller than *Cantharis Vesicatoria,*—its length being about six lines. The head is of a light red colour, with dark spots on the top; the feelers are black; the elytra or wing-cases black, with a yellow, longitudinal stripe in the centre, and a yellow margin; the thorax is black, with three yellow lines; and the abdomen and legs, which are of the same colour, are covered with an ash-coloured down. (*Wood & Bache.*) The flies appear—as their name imports—on the potato plant, and are first observed about the end of July or beginning of August. They are found in the morning and evening; and are collected by shaking them from the plant into hot water; after which they are carefully dried in the sun.

Cantharis vittata is a native of the middle and southern States. It resembles cantharis vesicatoria in all its properties.

Other species of cantharis are found in the United States, viz. C. CINER'EA, a native of the northern and middle States; C. MARGINA'TA; C. ATRA'TA, common in the northern and middle States, &c. &c.; but C. VITTATA is the only one that is officinal.

14. TARAX'ACUM.—DANDELION.

Leon'todon Tarax'acum, *Tarax'acum Dens Leo'nis* or *Common Dandelion*; SEX. SYST. Syngenesia Polygamia Æqualis: NAT. ORD. Compositæ Cichoraceæ, is indigenous in meadows and pastures in most parts of the globe, flowering all the summer. The root is the only part which is officinal in the Pharmacopœia of the United States. When fresh, it is tapering, and abounds with a milky juice, which contains bitter extractive, caoutchouc, resin, gum, sugar, and various salts. It yields its virtues to hot water, and hence the decoction is officinal in the Edinburgh and Dublin Pharmacopœias: the extract is in all of the British Pharmacopœias as well as in that of the United States.

Taraxacum is generally regarded as a diuretic and tonic; nay, it has even been supposed to be in addition, "aperient, deobstruent [?] and alterative," but how it produces these effects, and in what cases, we have yet to learn. The author has often administered it, and the results of all his trials induce him to consider, that its remedial agency is extremely restricted. That it is possessed of tonic powers to some extent, can no more be doubted of it than of other bitter vegetables; but even in this respect it is far inferior to most of the vegetable tonics. "After having been long abandoned in practice," observes a recent writer, "it was resumed not many years ago in this country, (*Great Britain*,) and became a fashionable remedy, especially in London, as a tonic aperient and alterative in dyspepsia, and as a deobstruent, and promoter of the biliary secretion in functional as well as organic diseases of the liver. It seems not without its use in dyspepsia and functional biliary derangements; but my own observation of its effects would lead me to infer, that much has been ascribed to the extract of dandelion in these and other affections, which must have been owing to collateral remedies, or to regimen and diet." (*Christison.*)

It is asserted to have been found beneficial in cases of dropsy dependent upon hepatic obstruction, but it is probable, that farther experience will limit more and more the range of its employment, and that it may ultimately be discarded altogether.

It may be given in the form of Decoctum Taraxaci, *Decoction of Dandelion.* (*Taraxac.* contus. ℥ij; *aquæ* Oij; boil to a pint.) Of this, from one to two fluid ounces may be given three or four times a day. It may be associated with other diuretics, as squill, or bitartrate of potassa.

EXTRAC'TUM TARAX'ACI, EXTRACT OF DANDELION. This extract is made from a decoction of the fresh root. The dose is twenty or thirty grains two or three times a day. The author rarely prescribes it except as an excipient for certain tonic or other agents, that require to be made into pills.

15. O'LEUM TEREBINTH'INÆ.—OIL OF TURPENTINE.

The characters of this volatile oil are pointed out under Excitants. In a moderate dose, it is unquestionably an excitant diuretic; yet its properties in this respect are by no means marked, and much of its character may have been derived from the fact, that its use—as well as that of the terebinthinates in general—gives occasion to a violet odour of the urine. It has been administered, however, in dropsy, and in asthenic cases is said to have been occasionally serviceable. It certainly cannot be indicated in dropsy of the active kind, accompanied with vascular excitement. In larger doses—as elsewhere remarked—it is a powerful excitant of the abdominal nervous system especially, and hence has been given in cases of tubercular meningitis, or what was conceived to be the stage of invasion of acute hydrocephalus (*Copland*); but in such case its diuretic operation was not looked to. In cases of lumbago, sciatica, &c., its operation is rather revellent than diuretic;—the excitant or revellent action being exerted on the kidneys.

It may be given in the dose of 8 or 10 drops three times a day, dropped on sugar, mixed with molasses, or made into an emulsion with mucilage or yolk of egg.

16. Copaiba, and 17. Cubebs (see Excitants) act much in the same manner as oil of turpentine. They are never given in dropsy as diuretics; but are prescribed where it is necessary to exert a revellent or excitant action on the kidneys. Yet they are often classed amongst diuretics.

Besides the agents already prescribed, the Pharmacopœia of the United States has admitted into the secondary list the following excitant diuretics.

18. Caro'ta, *Carrotseed*—the fruit of *Daucus Caro'ta*; Sex.

Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ—a common plant, growing wild in the United States, and flowering in June and July. The properties of carrotseed are probably dependent upon volatile oil, and are readily communicated to boiling water.

Carrotseed are not much used by the physician; but are frequently prescribed as a domestic remedy in affections of the urinary organs, and in dropsy. The dose of the bruised seed is from ʒss to ʒj. They are more commonly given in infusion. (*Carot.* ℥j; *Aquæ bullient.* Oj, to be taken during the day.)

19. **Delphin'ium**, *Larkspur*,—the root of *Delphin'ium Consol'ida;* Sex. Syst. Polyandria Trigynia; Nat. Ord. Ranunculaceæ—a species introduced from Europe, and now naturalized; flowering in June and July. The flowers, seeds and root are all said to be diuretic; but the last is the only part that is officinal. It is little, if at all used.

20. **Erig''eron Canaden'se**, *Canada Fleabane;* Sex. Syst. Syngenesia Superflua; Nat. Ord. Compositæ Corymbiferæ—an indigenous plant, common in the northern and middle States; flowering in July and August. The whole plant is officinal. Its main constituents are tannin, gallic acid, bitter extractive, and volatile oil. It is, therefore, astringent, tonic and, it is affirmed, diuretic; and has been given in dropsy and also in chronic diarrhœa and dysentery; either in powder, the dose of which is ʒss to ʒj; or in infusion. (*Eriger. Canadens.* ℥j; *Aquæ bullient.* Oj. Dose f. ℥iss to f. ℥iij.)

21. **Erig''eron Heterophyl'lum**, *Various-leaved Fleabane,* and E. **Philadel'phicum**, *Philadelphia Fleabane;* both of which are called *scabious*—are found in various parts of the United States, and are used as diuretics in dropsy. They are given in infusion or decoction. (*Eriger.* ℥j; *Aquæ bullient.* Oj. Dose f. ℥ij to f. ℥iv, every three or four hours.)

22. **Petroseli'num**, *Parsley*—the root of *A'pium Petroseli'num;* Sex. Syst. Pentandria Digynia. Nat. Ord. Umbelliferæ—a native of southern Europe, but cultivated in gardens everywhere. It contains an essential oil, which is said to communicate to it diuretic virtues. It is also affirmed to be aperient. The strong infusion has been advised in dropsical affections, and in diseases of the urinary organs in which a diuretic is considered to be indicated; but it is hardly ever used, and is not much worthy of the attention of the practitioner.

II. *Sedative Diuretics.*

23. DIGITA'LIS.—FOXGLOVE.

Digita'lis purpu'rea, or *purple Foxglove;* SEX. SYST. Didynamia Angiospermia; NAT. ORD. Scrophulariaceæ, is an herbaceous biennial plant, growing wild in most of the temperate countries of Europe, where it begins to flower in June, and ripens its seed in August and September. In the United States, it is cultivated both for ornament, and medicinal purposes. The leaves are alone officinal in the Pharmacopœia of the United States. The London Pharmacopœia admits also the seeds.

Doubts have existed, in the minds of many observers, in regard to the equal activity of the cultivated and the wild specimens, and in the doubt, the wild or native plants have been generally preferred.

The leaves are usually gathered, as first advised by Withering, in June or July, when the plant is coming into flower, or soon afterwards. It has been considered, however, unnecessary to restrict the gathering of them to this period, as their bitterness, which may perhaps be some measure of their activity, is very intense both in February and September, and their extract is highly energetic as a poison in the middle of April, before any appearance of the flowering stem, (*Christison.*) They should be dried very carefully, and be preserved from light and air. The midrib and footstalk—being possessed of little or no efficacy—may be removed before drying. In this state, they are of a dull green colour, faint odour, and bitter nauseous taste.

As met with in the shops of this country, digitalis is often in compressed masses, like the dried herbs in general prepared by the Shakers of Lebanon; and these cakes are not unfrequently found to be more or less mouldy; hence this mode of preparation has been properly objected to. (*Wood & Bache.*)

Digitalis readily yields its virtues to water and alcohol. It has been repeatedly analyzed, but no important pharmacological information has been obtained. At one time, its active principle was supposed to have been discovered, and was termed *Digitalin;* but the discovery has not been confirmed,—the digitalin being esteemed a mixture of other matters. More recently, an empyreumatic oil has been obtained from the product of destructive distillation, which is composed, in part, of a highly narcotic crystalline principle. When given to a rabbit, it caused paralysis of the hind legs, convulsions, laborious and rapid breathing, and accelerated action of the heart. (*Morries—Stirling.*)

The effects of digitalis on the nervous system, and, through it, on many of the functions, will be described under the head of

NARCOTICS. In this place, its action on the kidneys alone falls under consideration. This it exerts both in disease and health, and hence it is properly a direct diuretic.

On inspecting the testimony of various observers in regard to the dropsical cases, in which the diuretic virtues of the digitalis have been had recourse to, much that appears to be irrational is perceptible. It is well known to be a powerful sedative, and as such is employed, whenever the force of the circulation has to be controlled, as in hypertrophy of the heart, and in great vascular excitement, no matter how produced; hence it would seem to be especially adapted for the sthenic forms of dropsy; yet we are told by Withering—and the remark has been handed down from one therapeutical writer to another—that "it seldom succeeds in men of great natural strength, of tense fibre, of warm skin, of florid complexion, or in those with a tight and cordy pulse." "On the contrary"—it is affirmed—"if the pulse be feeble or intermitting, the countenance pale, the lips livid, the skin cold, the swollen belly soft and fluctuating, or the anasarcous limbs readily pitting under the pressure of the finger, we may expect the diuretic effects to follow in a kindly manner." (*Withering.*) Yet, if we know anything rational concerning the *modus operandi* of digitalis, it ought to be adapted for the first set of cases rather than for the last. Doubtless, it may be itself insufficient to reduce the sthenic condition of the system, and may require the use of an active antiphlogistic treatment, premised or combined with it; yet in the sthenic class of cases, its utility has been most manifested; and such is the result of the author's experience. It certainly has not been found by him "most serviceable in dropsies associated with an enfeebled state of the constitution." (*Christison.*) The writer just cited, affirms, moreover, that "dropsies depending on diseased heart, are more under its influence than any other kind, and next those connected with diseased kidneys;" but this cannot be regarded as established. No general assertion of the kind is, indeed, admissible, inasmuch as every thing will depend upon the degree of cardiac mischief, that gives occasion to the dropsy. Too often, in such cases, all remedies fail; and, in the very nature of the circumstances, they can only act as palliatives.

As a diuretic, digitalis should be given in small doses—for example, one grain of the powder three times a day, until the effect is induced. In all cases, however, the patient should be watched, and if great depression of the powers of the circulation, giddiness, insomnia, nausea and vomiting or convulsions should supervene, its use ought to be suspended. It has been the opinion of some practitioners, that its effects are *cumulative*, and that they may explode—as it were—some time after it has been discontinued. This may be borne in mind. At the same time, it is proper to add, that although the author has prescribed it largely, in hospital and in private practice, he has never witnessed this cumulation, which has been the source of so much alarm to others.

Digitalis is not often, perhaps, given as a diuretic alone. It is either combined with squill, bitartrate of potassa, or with the mild chloride of mercury—with the latter, for the reasons already expressed, (p. 271.) The Edinburgh College has a PILULA DIGITALIS ET SCILLÆ, which is a combination of two of the diuretics mentioned. (*Digital.*, *Scillæ* āā p. i: *Confect. aromat.* p. ii. Beaten into a proper mass with *confection of red roses*, and the mass divided into four grain pills.)

The INFUSION and the TINCTURE are officinal in the Pharmacopœia of the United States; and the latter is perhaps most frequently employed.

INFU'SUM DIGITA'LIS, INFUSION OF FOXGLOVE. (*Digitalis* ʒi; *Aquæ bullient.* Oss; *Tinct. cinnam.* f. ℥j.) The tincture of cinnamon is added to prevent the digitalis from affecting the stomach. The infusion is a good preparation; by some, indeed, believed to be the most effective of any. Its dose is f. ℥ss. to f. ℥j. repeated every six hours or oftener.

TINCTU'RA DIGITA'LIS, TINCTURE OF FOXGLOVE. (*Digitalis* ℥iv; *Alcohol dilut.* Oij;—made by maceration, or by displacement.) The usual dose of this tincture is ten drops, repeated three times a day, and cautiously increased where considered advisable. This quantity the author has generally found sufficient to induce not only the diuretic but the sedative effects of the drug. Others, however, (*Pereira*, *Christison*, *A. T. Thomson*,) fix the usual dose at *ten minims* repeated every six hours, and Dr. Pereira states, that he commonly begins with ♏xx. The largest dose he has employed is f. ʒj. It has, he states, been given to the extent of *one ounce!* The author has known some cases of protracted and severe disease in which very large doses have been administered with impunity; but these cases of resistance must be considered as exceptions rather than as forming the rule. They may, also, be occasionally explained by inactivity in the preparation. None but well-prepared and well-preserved leaves should be used in the formation of the tincture; and a great superiority has been observed in that made from carefully preserved leaves imported from England. (*Wood & Bache.*)

24. COL'CHICI RADIX.—COLCHICUM ROOT; AND COL'CHICI SEMEN.—COLCHICUM SEED.

The general properties of Colchicum are described under the head of Sedatives. In its effects it is said to resemble digitalis in one thing,—that it renders the pulse less frequent (*Thomson, Willis*): others, however, (*Osann, Riecke,*) think, that it agrees more with the squill in certain respects, and they would, consequently, class it rather amongst the *Excitant Diuretics.*

The root, and the seed have been given as diuretics in dropsy, both formerly and in more modern times. In such cases it is well to push the remedy until it affects the bowels as well as the kidneys.

The dose of the dried root and the seeds is the same,—from two to eight grains.

ACETUM COL'CHICI, VINEGAR OF COLCHICUM. (*Colchic. rad.* contus. ℥ij; *Acet. destillat.* Oij; *Alcohol* f. ℥j; prepared either by maceration or displacement.) Vinegar of colchicum has been a favourite diuretic in dropsy. Its dose is from f. ʒss. to f. ʒj.

The other preparations of colchicum are given under Sedatives.

25. VERA'TRIA.

This active principle, whose properties are described under Sedatives, is also possessed of diuretic powers; partly, perhaps, owing to the sedative agency, which it has been found to exert on the heart's action, even when applied externally. (*Turnbull.*) The testimony of one observer in its favour is so strong as to savour of undue enthusiasm:—"Unadulterated veratria," says Ebers, "acts often on the urinary secretion with magical powers, and it may seem fabulous, when I state, that friction with a very weak ointment of veratria two or three times in the twenty-four hours on the inner part of the thigh, or the back, epigastric region or around the navel, has excited such a copious secretion of urine, that the patients, under its long continuance, began to feel weak, and the anasarca, and even the dropsical accumulation in the abdomen, in a short time almost disappeared, circumstances, which indicate the caution that ought to be observed in apportioning the dose, when we are satisfied of the goodness of the article."

The experience of Ebers has been confirmed by that of others; but some have found it of no avail, (*Bardsley, Späth,*) and it is now scarcely employed.

Veratria may be given in Tincture, (*Veratr.* gr. iv; *Alcohol,* ℥j. Dose, gtt. x to xxv in water); or rubbed on the skin in Oint-

MENT, (*Veratr.* gr. v—xx; *Adipis*, ℥j. A piece the size of a hazelnut to be rubbed on the skin for five or ten minutes, night and morning.)

IV. ANTILITHICS.

DEFINITION OF ANTILITHICS, AND OF LITHONTHRYPTICS—CALCULOUS DIATHESIS—LITHIC AND PHOSPHATIC DIATHESES—DIFFERENT VARIETIES OF CALCULUS—THERAPEUTICAL APPLICATION OF ANTILITHICS TO THOSE VARIETIES—LITHONTHRYPTICS—SPECIAL ANTILITHICS.

THE class of antilithics comprises agents, that counteract the tendency to the formation of calculous concretions in the urinary organs. Under the same head may be investigated the *modus operandi* of lithonthryptics, or agents which are capable of dissolving such concretions; but as our means for the latter purpose are extremely limited, and rarely available or successful, attention will be mainly directed to the class of antilithics.

1. *Antilithics.*

Antilithics are amongst the most interesting of the classes of therapeutical agents; for what disorder is there, that excites more mental uneasiness and apprehension than any form of calculous deposition. The pain attendant upon the presence of stone in the bladder; the inutility of remedial agents, when once it has formed, excepting so far as concerns the prevention of its increase, and the serious operations demanded for its removal,—are sufficient grounds for the anxiety, which is felt by every one, when he has reason to believe that he is labouring under the calculous diathesis.

That such a diathesis may be present, we have the most unquestionable evidence, and when it exists, the greatest difficulty occurs in removing the tendency to deposition. Often, it appears to be owing to an organization derived from progenitors; when —like every other hereditary tendency—it is almost irremediable, although due attention to diet and regimen may accomplish much.

That this diathesis is connected with a morbid condition of the secerning function of the kidney is clear. We find the organ forming that which it ought not, and the urine depositing that which it ought not; but this *vice* of secretion is clearly connected with a morbid condition in other organs. The whole system of nutrition is often implicated; the gastric functions are imperfectly performed; the nutrition of the body is impaired, and in the phosphatic diathesis especially—when largely developed—every symptom is present, which is considered to indicate *cachexia.*

The ordinary urinary calculi arise from the deposition of substances, which are contained in that fluid in a state of health, but are rendered insoluble, owing to various circumstances; but some calculi—as the oxalates—do not exist in the urine in health, and must, consequently, be formed, by chemico-vital influence, in the kidney. It becomes, however, an interesting topic of inquiry—whether the mischief be, in these cases, seated altogether in the kidney, or whether it may not be, in part, owing to the blood being modified, in consequence of general faulty nutrition, so that it contains matters which do not exist in it in the normal state. In reply to this, it has been urged, that such matters ought to be detected by the chemical analyst; but this objection is invalid, for the reasons elsewhere stated—that it is by no means easy to detect even an inorganic substance,—of whose presence we may, notwithstanding, be certain—when it becomes mixed with compounds of organization: it may be so masked by the latter, that its presence cannot be indicated by the ordinary—or, indeed, by any—reagents. On the other hand, there is strong reason for presuming, that the disease is not altogether seated in the kidney, when we reflect on the great similarity between the calculous and the gouty diathesis. It is a common remark, founded on just observation, that of the children of gouty parents, some may be liable to gout, and others to calculus,—the males, who are exposed to indulgence in the ordinary exciting causes, being more subject to the former disease;—the females to the latter. Both diseases are accompanied by more or less gastric and intestinal derangement, and by modified nutrition in general; and another striking point of similarity is the presence of urate of soda in the concretions, which are met with in the joints of those who have suffered from repeated arthritic attacks. Lithic or uric acid was, at one time, supposed to exist in the urine only, and it is the constituent of one form of urinary calculi; yet, in gouty cases, we have it separated from the blood by other organs than the kidneys, and are, consequently, compelled to infer, that, in calculous cases, the disease may not merely consist in faulty secretion by those organs, but that the blood may contain elements, which can be combined in other secreting organs; and they clearly are so, in the case of the gouty concretions in question.

In the treatment of calculous cases, therefore, it becomes a matter of moment, that our attention should not be directed exclusively to the condition of the kidneys, but that it should be extended to the state of the whole system; and experience exhibits the correctness of this doctrine.

The results of the chemical researches of Liebig lead him to infer, that when uric acid is subjected to the action of oxygen under certain conditions, it undergoes a metamorphosis, whence, amongst other matters, oxalic acid may result. "Calculi, containing uric acid, or oxalic acid," he says, "are never found in phthisical patients"—a remark, however, which requires fresh observations before it can be considered established; and he adds, "it is a common occurrence in France, among patients suffering from calculous complaints, that when they go to the country, where they take more exercise, the compounds of uric acid, which were deposited in the bladder during their residence in town, are succeeded by oxalates, (mulberry calculus,) in consequence of the increased supply of oxygen. With a still greater supply of oxygen, they would have yielded, in healthy subjects, only the last product of the oxidation of uric acid, namely, carbonic acid and urea."

The two chief calculous diatheses are—the *lithic* or *uric*, and the *phosphatic*. The *former* is attended by a state of the urine, which reddens litmus paper; by yellow, red, or lateritious, or pink depositions of lithate of ammonia; or by the appearance of *red gravel*, which consists of crystals of lithic acid. In the *latter*, the urine is pale; at times alkaline; and there is a deposition of *white gravel*, or crystals of phosphate of magnesia and ammonia; or the white sediment contains the mixed phosphates of magnesia, ammonia and lime.

At times, these two diatheses do not alternate in the same individual, but there is usually a great disposition for the lithic to change into the phosphatic. The urine becomes pale, under slight causes of general, or gastric disorder; mixed lithic and phosphatic deposits occur, or an iridescent pellicle of triple phosphate forms upon its surface. (*M. Hall.*) At length, the urine becomes alkaline, and white gravel is deposited. The phosphatic diathesis is now confirmed.

These are the chief diatheses, but others may be enumerated. For example, the crystals of the triple phosphate are apt to be changed for a pulverulent deposit of that phosphate, mixed with phosphate of lime. This mixture constitutes the *fusible calculus*, and into this all the other forms of calculous diathesis have a tendency to pass. Again, a diathesis exists, in which the *mulberry calculus* or that which consists of oxalate of lime may be formed.

From different data, examined by Dr. Prout, it appears, that lithic acid predominates in more than one-third of the whole number of urinary calculi; and, very generally, it forms the nucleus even of other varieties. It would seem, consequently, that the deposition of lithic acid is a primary step in the formation of urinary calculi, and that the phosphatic and oxalatic formations are the result of a gradual transition from the lithic to the phosphatic or oxalatic diathesis. In the progress of this transition, the lithic acid deposition is, in the first instance, changed into one of lithate of ammonia, with a loss of the tinge derived from the colouring matters of the urine. After some time, this last gives place to a sediment, which is chiefly composed of carbonate and phosphate of lime; and this is ultimately succeeded by a deposition of the phosphates of lime and magnesia, in combination with ammonia. From all his inquiries on the interesting subject of urinary depositions, Dr. Prout conceives himself warranted in deducing the general *law*, "that in urinary calculi, a decided deposition of the mixed phosphates is never followed by other depositions."

Any unusual formation of acid, in the stomach, or elsewhere, may be the cause why lithic acid is deposited from the urine. If we add acid to healthy urine, it is thrown down in small reddish crystals. The lithate of ammonia, which exists in the urine, is decomposed; the acid, which we add, lays hold of the base, and lithic acid is deposited. We can thus understand, that a deposition of lithic acid crystals may be an evidence of acid dyspepsia. In this last affection, again, as well as in other states of the system, there may be an undue formation of lithic acid or of lithate of ammonia,—as in those labouring under the lithic acid diathesis,—and calculus or gravel may be deposited from such redundancy.

Therapeutical Application of Antilithics.

The remedies belonging to the class of antilithics, after what has been said, will be sufficiently apparent. Whenever, from the appearances presented by the urinary deposits, and by the concomitant symptoms of lithiasis, it is manifest, that lithic acid or lithates are separated from the urine in undue quantity, remedies of the alkaline class should be employed to neutralize any predominant acid, and, along with these, tonic and revulsive means for improving the general health. Dr. Prout has shown, that when the lithic acid diathesis exists, and the urine is constantly acid, high coloured, and concentrated, repeated doses of alkalies not only render the urine alkaline, but keep it so as long as they are employed. With these views, the *liquor potassæ*, or the carbonates of potassa and soda are administered with some vegetable tonic, and a thorough change of all the physical and moral circumstances surrounding the individual,—if this be practicable. Change of air, of society, and scenery, must, indeed, be regarded as amongst the most important agents, not only in the lithic acid

—but in every kind of calculous—diathesis. The importance, too, of keeping up a free cutaneous exhalation is obvious. The perspiration is acid, and if this acid be not exhaled, its retention in the system may give rise to the acid predominance of which mention has been made. On these grounds it has been affirmed, that dyspepsia tends to increase the deposition of lithic acid, and to lessen that of the phosphates, both by producing acidity of the primæ viæ, and by rendering the skin inactive; and that indolence has the same tendency, both by inducing dyspepsia, and by lessening the activity of the skin, in proportion as it impairs the vigour of the constitution. (*W. Philip.*)

Dr. A. T. Thomson asserts, that lithic acid, in a healthy condition of the habit, is freely thrown off by the cutaneous exhalents, but he, probably, has not sufficient ground for the assertion; nor is it necessary to suppose the exhaled acid to be the lithic—to account for the increased deposition of the lithic acid from the urine, in the cases we have been considering. Any acid predominance may induce the same effect.

It has been recently affirmed by Dr. A. Ure, that hippuric acid is found in the urine after benzoic acid has been taken, whilst not a trace of lithic acid is observable. Should this be confirmed, benzoic acid might be found an excellent remedy in the lithic diathesis. Dr. Ure has suggested its employment, or that of a benzoate, in the gouty diathesis, to prevent the formation of the concretions of urate of soda. The facts mentioned by Dr. Ure have been confirmed by others, (*Keller*, *Garrod*, *Liebig.*)

The causes, that give rise to the deposition of the phosphates, are of different character. In one respect, indeed, they are antitheses to each other. The phosphates in healthy urine are considered by Berzelius to be held in solution by free phosphoric and lactic acids; and, if anything interferes with the presence of these acids in due quantity, the phosphates are deposited. Prout offers another explanation, which is more simple and intelligible. The phosphates, he says, exist in the urine as supersalts, and in this state are soluble; but, if anything neutralizes the redundant acid, so as to reduce the supersalt to a neutral salt, it is then deposited—the neutral phosphates being insoluble. If a few drops of ammonia be added to healthy urine, the phosphates are thrown down, and the cause of this deposition is differently explained by Berzelius and by Prout, according to their peculiar views;—the former considering, that the ammonia neutralizes the free phosphoric and lactic acids; and the latter, that it neutralizes the excess of phosphoric acid.

The general symptoms that accompany the deposition of the phosphates, are often very distressing: both the *physique* and the *moral* are greatly implicated. Derangement of the digestive organs is a universal concomitant, succeeded by every symptom of impaired nutrition. In some cases in which the bladder has lost a portion of its muscular power—as in disease of the prostate, in affections of the spine, and in the aged, the urine is retained so long in the bladder, that it undergoes, it is affirmed, partial decomposition; ammonia is generated, and a deposition of the ammoniaco-magnesian phosphates takes place.

As far as regards the use of chemical remedies, the selection for the phosphatic diathesis is obvious. That which is proper for the lithic acid diathesis, would be obviously injurious in this: accordingly, alkaline remedies have to be avoided, whilst acids—especially mineral acids—can be administered with great advantage. They may not only pass into the blood, and act chemically on that fluid, but invigorate the digestive apparatus and prevent fresh deposition.

In cases of the *alternating calculi*, the treatment has necessarily to be varied, according to the character of the deposition,—acid or alkaline remedies being given according as the deposits are at the time phosphatic or lithic acid; but in the depositions of oxalate of lime, nothing but general management can offer any prospect of benefit. There is no chemical antilithic available in these cases. All that can be done in this, as well as in the other forms of the calculous diathesis—when inveterate—is to inculcate the necessity of a thorough change of the physical and moral influences surrounding the individual, so as to break in upon the morbid catenation as effectively as possible. With this view, travelling air and exercise are recommended, with all their revulsive accompaniments; a well regulated diet and regimen; attention to the condition of the bowels, and everything that can induce tone in the economy generally. By thus modifying the whole system of nutrition, the calculous diathesis may occasionally be got rid of, and no farther signs of lithiasis may occur, even when the individual has been previously strongly disposed to, and even labouring under, calculous depositions.

If the views of Liebig, however, be correct, (p. 292,) it would seem, that in the case of the lithic depositions, country air would be injurious to residents of towns by converting the depositions into those of the oxalates:—but this matter cannot be considered settled. In the case of an intelligent medical gentleman, from the interior of Maryland, who consulted the author some time ago, phosphatic depositions, which were copious, were invariably corrected by the free use of saccharine aliment.

From what has been said, we can fully understand the agency of tonics and astringents, when employed as antilithics. But it has been imagined, that certain bitters, which combine an astringent principle, are peculiarly adapted for such cases; this principle being presumed to enter the circulation, and to act more particularly on the kidneys. At one time, indeed, it was believed—it need hardly be said most erroneously—that such vegetables possess chemical or solvent properties. Of these tonics—presumed to operate especially as antilithics—the leaves of the diosma crenata or buchu; the root of the pareira brava, and the leaves of the uva ursi have been mainly recommended; but the author is not prepared to corroborate the once prevalent, but now generally exploded, idea, that they produce other results besides those of acting as astringent tonics on the stomach, and of improving the gastric functions. (See, on the nature and therapeutics of calculous depositions, the author's *Practice of Medicine*, ii. 99, Philad. 1842.)

2. *Lithonthryptics.*

Thus far of antilithics.—Not much can be said on *lithonthryptics* or solvents of calculi. The fact, that certain mineral waters, as the Vichy, render the urine alkaline, could scarcely fail to suggest their use in calculous affections. It would not seem, that the destruction of calculi by the water is effected merely, or perhaps chiefly, in the way of solution, but that it is accomplished in a very considerable degree, especially as regards those of the triple phosphates, by a kind of disintegration of their component particles. When calculi consist of the oxalate or phosphate of lime, mingled with lithic acid, lithate of ammonia, or the triple phosphate, Vichy water is said to attack and disintegrate them rapidly. These waters contain a large amount of free carbonic acid, and nearly a drachm and a half of bicarbonate of soda in every thousand drachms of the menstruum. Besides greatly increasing the quantity of the urine, they exert a decided influence on its chemical constitution; rendering it rapidly neutral if previously acid, and afterwards alkaline; from being high-coloured it becomes pale, and having deposited copiously, it becomes limpid and transparent. The experiments of several observers are certainly encouraging, and suggest the importance of employing the fictitious waters of Vichy where the natural water is not attainable. A formula for these is given hereafter.

Under views analogous to those which have suggested the use of the alkaline mineral waters, the different alkalies and alkaline earths have been freely administered as lithonthryptics. It is not probable, however, that either the mineral waters in question, or the alkalies, can generally be productive of benefit except where the depositions are of lithic acid or the lithates. Still the fact must be borne in mind, that under protracted administration of such waters, and likewise of alkalies, combined with the free use of diluents, calculi of other kinds have experienced disintegration. Where, too, these agents have failed to dissolve or break down the calculus, they would seem to have greatly mitigated the sufferings. (*Practice of Medicine*, ii. 150.)

Solvents might be brought into immediate contact with vesical calculi by injection; and, in this way, alkalies and acids, properly diluted, have been employed. Experiment seems to have shown, that the bladder cannot bear the presence of an alkaline solution sufficiently strong to dissolve a lithic acid calculus; but it would appear, from the experiments of Sir Benjamin Brodie,—that loose concretions of the phosphates and of carbonate of lime may be acted upon by a weak solution of nitric acid, and thus be gradually removed from the bladder. The strength of the solution, employed by Sir Benjamin, was two minims and a half of the acid to a fluid ounce of distilled water. The injection was sent through a cannula of pure gold. It occasioned no pain: the patients experienced relief from all their symptoms; the quantity of adhesive mucus from the lining membrane of the bladder was diminished; and the constant desire to empty the organ much abated. By testing the fluid that had been used with a concentrated solution of ammonia, the phosphates were abundantly precipitated,—proving that the calculi had been acted upon.

It has likewise been proposed, (*Prévost & Dumas*,) to employ galvanism for the decomposition of calculi in the bladder, by passing the wires, connected with the poles of a galvanic apparatus, into that viscus—but the proposition has received little attention. It is probable, indeed, that any decomposing power, which could be introduced within the bladder in this way, would be apt to act upon the organ itself, and, consequently, not be devoid of danger. Cystitis is an affection to be apprehended, indeed, from all such agents.

The most important lithonthryptics belong to the domain of surgery, and do not, therefore, fall under consideration in this work. It seems clear, from the experience of practitioners on both sides of the Atlantic, that there are cases which admit of urinary calculi being broken down in the bladder, by the introduction of contunding instruments into that organ, without the bladder necessarily suffering; and the operation of lithotrity, or lithothrypsy, or lithotresis, must be included amongst those improvements, for which the philanthropist has to thank the genius and daring of the modern surgeon.

SPECIAL ANTILITHICS.

1. *Acid Antilithics.*

The circumstances under which acids are advisable in calculous depositions have been pointed out already, (p. 294.) It was then shown, that they are eminently serviceable in the white or *phosphatic* depositions, whilst they cannot fail to augment the *lithic* depositions.

Of the Mineral Acids, either the *sulphuric,* the *muriatic,* or *nitric* may be prescribed; but preference is usually given to the two first; under the notion, derived, perhaps, from too limited experience, that the last disagrees with some stomachs. It has been given, however, in large doses without any such inconvenience resulting. (*Sir B. Brodie, A. T. Thomson.*) The muriatic acid would seem to be the most congenial, inasmuch as it is one of the acids always secreted in the healthy state of the stomach, and, therefore, taken at times with impunity even by those who suffer from acidity. In *neutral* or *alkaline indigestion,* as it is termed, which is occasionally mistaken for acid indigestion, this acid is the great remedy.

Muriatic acid may be given in the dose of from ♏x. to ♏xl. in any demulcent drink; and during its administration—indeed, whenever acids of any kind are given—the urine must be carefully inspected, and if any signs of the lithic depositions appear, it must be discontinued.

Both in the case of children and of adults, the careful use of mineral acids is to be preferred; if for no other reason, on account of the uncertainty that exists in regard to the *modus operandi* of the Vegetable Acids. It is the common belief, indeed, that the latter are decomposed, and, accordingly, a difficulty may exist in knowing whether they may be beneficial or the contrary. Observation ought to settle this question, but it has not yet done so. Hence, the ordinary mineral water or soda water of the shops may be an equivocal remedy in phosphatic depositions, so far as regards its chemical agency; yet it may be of essential service through the gentle stimulus which it gives to the digestive function. Of late, the *lactic acid* has been suggested, (*Magendie,*) owing to the facility with which it dissolves phosphate of lime. From one to four drachms of it may be dissolved in a quart of water, sweetened with two ounces of syrup, and taken as lemonade. (See the author's *New Remedies*, 3d edit. p. 27, Philad. 1841.)

2. *Alkaline Antilithics.*

Alkalies, as already remarked, are indicated in cases of lithic depositions; in which they seem to prove beneficial not only through their action in the stomach as antacids, but likewise by passing into the mass of blood and being separated by the kidneys. That they do act in the latter manner is shown by the fact, that after they have been administered for some time, the urine, from being acid, is rendered alkaline. In a state of health, indeed, the constant use of alkalies may occasion the deposition of white or phosphatic sediments. Mr. Brande has affirmed, that he has known "soda water, exhibited in a case of stone in the bladder, produce abundance of white sand, which the ignorance of the patient and his medical attendant led them to refer to the solvent power of the medicine upon the stone, which they thought was gradually giving way and being voided; whereas great mischief was doing, by giving the urine more than its usual tendency to deposit the phosphates, and, consequently, to augment the size of the calculus." It would be singular, however, were the effect, in this case, to be referable to the action of the soda water, which, as generally sold in the shops, contains no alkali whatever, and is in reality acid by its impregnation with carbonic acid.

The LIQUOR POTASSÆ or *Solution of potassa*, was at one time more employed as an antilithic and lithonthryptic than any of the alkalies. An objection urged to the pure alkalies has been, that they are apt to induce irritation in the lining membrane of the stomach, and such might be the case if they were given in very large doses. It must be recollected, however, that more or less acid is generally present in that organ, by means of which a portion, and, in particular cases, the whole of the alkali administered may be neutralized. Cases too, are recorded, in which the potassa has been administered for a long period, and in considerable quantity, without the supervention of any disagreeable results. One patient took it regularly for ten years, and during that time passed many calculi, all of which had their angles rounded, and their edges blunted, "in a manner, which could hardly be explained except from the long continued effect of the alkaline medicine." (*Marcet.*) Still, the bicarbonates of the alkalies are devoid of the causticity of the pure alkalies, whilst they have the same antilithic properties. They ought, consequently, to be preferred.

The dose of Liquor Potassæ is ♏x. to ♏xxx., given two or three times a day in water. Veal broth and table beer have been recommended as vehicles, but although the latter disguises the urinous and unpleasant odour of the alkali, the acid of the beer will neutralize a portion of it; and the beer itself is but little calculated for the phosphatic diathesis. An empirical remedy for stone, known under the name of *Dr. Chittick's nostrum*, is said to be a solution of alkali in veal broth. (*Pereira.*)

The Carbonates of Potassa and Soda are milder preparations of the alkalies, and yet at least equally effective antilithics with the pure alkali. The bicarbonate of soda is the most agreeable, and is probably as efficacious as any of these preparations; yet the use of potassa has appeared to prove beneficial in calculous affections, where soda failed to afford any relief, and it is important to bear in mind a fact mentioned by Prout, that the urate of potassa is a soluble salt, the urate of soda insoluble. As it is possible, however, that the main efficacy of antilithics may be exerted upon the first passages, and on the blood, rather than on the kidneys, the circumstance, mentioned by Prout, may not be a valid objection to the use of the soda. Sir Gilbert Blane accounted for the greater advantage of soda in calculous complaints upon the assumption, that soda becomes applied to the purposes of the economy before it arrives at the kidneys; whereas potassa passes to those organs to be thrown off from the system. The dose of the carbonates of potassa and soda as antilithics is from gr. x. to ʒss; of the bicarbonates of the same alkalies, from gr. xx. to ʒj. They may be given in water, or in the common soda water of the shops.

Ammonia and the Carbonate of Ammonia are at times administered with the same view. Their effects would seem to be wholly exerted upon the primæ viæ; and the same is probably the case with Magnesia, Carbonate of Magnesia, and Lime-water. The first and second of these are used largely as antilithics. Magnesia was first strongly recommended by Mr. Brande, who properly remarks, that under its use, in the lithic diathesis, the red deposit, in the urine becomes much diminished, or disappears altogether, and the irritation of the kidneys is proportionately relieved. It must be borne in mind, however, that magnesia sometimes accumulates in the bowels, when it is given for a long period. Either magnesia or its carbonate may be prescribed in the dose of from gr. x. to gr. xxx. in water or milk. The *fluid magnesia*, elsewhere described, (p. 157,) is a good preparation in these cases. It is a solution of magnesia in carbonated water.

It is by virtue of the alkali they contain, that the Vichy waters,—already referred to—are so celebrated in France in calculous cases. These are in such high repute, that they are directed to be prepared artificially, and are sent to every part of Europe; but it need scarcely be said, that no artificial or real water, drunk away from the spring, and therefore without the accompanying advantages of travelling air and exercise, can be regarded as substitutes for the water taken at the source. The following form for the *artificial Vichy water* is given in the *Codex Medicamentarius* of Paris:

Take of *simple acidulous water*, impregnated with twice its bulk of *Carbonic acid*, ʒxxss; *Carbonate of soda*, gr. xxxij; *Sulphate of soda*, gr. xvj; *Muriate of soda*, gr. iv; *Carbonate of magnesia*, gr. ss; *Muriate of iron*, gr. ¼.—M.

In this country, the Saratoga waters constitute an excellent remedy, and not the less so from the slight impregnation of iron, which they contain.

3. *Tonic Antilithics.*

1. DIOSMA.—BUCHU.

The Pharmacopœia of the United States, along with those of London and Dublin, refers Buchu Leaves to *Dios'ma crena'ta*, whilst the Edinburgh Pharmacopœia assigns them to various species of *Baros'ma.* "This drug"—says Dr. Christison—"furnishes a good illustration of the inconvenience of attempting a correct botanic nomenclature of the articles of the Materia Medica. It has been known in Britain for about twenty years under its original Hottentot name of Buckhu or Buchu; but the London College had scarcely admitted it into the Pharmacopœia under the botanical name of Diosma, before botanists discovered that the plant or plants from which it is obtained must be removed into a new genus, now termed *Barosma.*"

Diosma or *Barosma,* Sex. Syst. Pentandria Monogynia; Nat. Ord. Rutaceæ, is a native of Southern Africa, near the Cape of Good Hope. Several species are used by the Hottentots, on account of their odorous and medicinal virtues. A powder, which they use for anointing their bodies, is composed of various odorous matters, and chiefly of Barosmas. They are small shrubs, which have a heavy and peculiar smell; hence the name *Barosma*—from βαρυς, 'heavy,' 'powerful,' and οσμη, 'odour;'—by some considered 'divine;' hence the name *Diosma,* from διος, 'divine,' and οσμη, 'odour.'

Buchu leaves—as met with in the shops—are composed of those of several species of barosma, intermixed with stalks and fruit. They are smooth, somewhat shining, sharply or bluntly serrated or crenated, and are studded with little oil vesicles, containing the essential oil, which gives them a portion of their odour. The taste of the leaves is aromatic, somewhat pungent, and bearing some resemblance to peppermint. (*Buchner.*) Others, however, compare it to rue, others to rosemary, others to cumin, and others, again, to the urine of the cat. (*Pereira.*)

The main constituents, afforded by analysis, are a volatile oil, of a yellowish-brown colour, and lighter than water, which has the odour of the leaves,—and a bitter extractive matter, *Diosmin.* The leaves afford their virtues to both water and alcohol.

The medical properties of diosma—like those of the other articles under this head—have been greatly exaggerated. By virtue of the volatile oil, they are excitant, and perhaps slightly diuretic; and, by their bitter extractive, tonic. They are, consequently, adapted for giving tone to the digestive organs, and through them to the general system; but the evidence is utterly inadequate to show, that they have otherwise any effect in calculous diseases; or that they possess any special action on the urinary organs. Dr. Wood has correctly remarked, that "they are chiefly given in complaints of the urinary organs, such as gravel, chronic catarrh of the bladder, morbid irritation of the bladder and urethra, disease of the prostate, and retention or incontinence of urine from a loss of tone in the parts concerned in its evacuation;"—and he might have added, from his extensive acquaintance with the subject, that we are not in possession of any remedy which could act beneficially in diseases of such opposite characters. The suggestion, that in lithiasis, attended with increased secretion of uric acid, diosma should be given in combination with alkalies, is good, inasmuch as in this manner we neutralize any preponderance of acid; whilst, at the same time, we give tone to the system, and thus remove the tendency to its fresh generation.

The dose of the powder is from gr. xx. to ʒss.

INFU'SUM DIOS'MÆ, INFUSION OF BUCHU. (*Diosmæ* ℥j; *Aq. bullient.* Oj.) Dose, f. ℥j. to f. ℥ij.

The Dublin Pharmacopœia has a TINCTURE OF DIOSMA, (*Diosm.* ℥v; *Alcohol. dilut.* Oij;—made either by maceration or percolation,) the dose of which is from f. ʒj. to f. ℥ss.

2. PAREI'RA.—PAREIRA BRAVA.

Pareira of the Pharmacopœias is the root of *Cissam'pelos Parei'ra, Parei'ra Brava* or *velvet leaf;* SEX. SYST. Diœcia Monadelphia; **Nat. Ord.** Menispermaceæ, a climbing plant, which is a native of South America and the West India islands.

The root—as met with in the shops—is in roundish pieces, from half an inch to four inches in diameter; from four inches to some feet in length, and often split longitudinally. The epidermis is thin; of a brown colour, furrowed longitudinally, and wrinkled transversely. The interior of the root is of a yellowish colour, very porous, and marked by irregular concentric circles. It is devoid of smell, and has a sweetish and afterwards nauseous bitter taste.

The active principle of the root is considered to reside in a yellow bitter matter, which is soluble in both alcohol and water. A new vegetable alkaloid principle has been separated by Wiggers, to which he gave the name *Cissampelina;* but whose properties have not been described.

Pareira yields its medical virtues to water, and hence an extract, and an infusion, are officinal in the London and Edinburgh Pharmacopœias. The Pharmacopœia of the United States has no officinal preparation of it. The same properties have been assigned to it as to the diosma; with the addition, that it was at one time highly extolled as a lithonthryptic, and it was even affirmed, that calculi—the size of an olive—had disappeared under its administration. (*Helvetius.*) The author has carefully watched its effects, but neither in its general action on the system, nor in its effects in calculous depositions, nor in chronic diseases of the urinary organs, has he seen any other properties than those possessed by the ordinary bitter tonics; and, where other results have supervened, in the practice of others, it is probable that they were owing to the system of medication combined with it. He has not had the shadow of a reason for believing it "to possess specific virtues over various disorders of the urinary organs, more especially chronic inflammation of the bladder." (*Christison.*) "A careful inquiry into its physiological action," says the writer just cited, "is much wanted; for some have failed to observe the diuretic and aperient properties ascribed to it by others; and they are disposed to think, as would be anticipated alike from its sensible qualities, and its place in the natural arrangement of vegetables, that it is nothing else than an excellent tonic bitter, akin to calumba. The authority of Sir B. Brodie, who has recommended it in chronic urinary diseases, and especially in chronic inflammation of the urinary bladder, has of late brought it into general employment. The information communicated to me on this point by various surgeons here who have made trial of it is not in its favour."

Sir Benjamin recommends a decoction prepared by simmering four ounces of the root in three pints of water, until the fluid is reduced to two pints. From six to twelve fluidounces of this decoction may be taken in the twenty-four hours; but it is important to add, in judging correctly of its virtues, that Sir Benjamin is in the habit of adding to it the tincture of hyoscyamus; and where there is any deposition of the triple phosphates, indicated by milky urine, with an iridescent pellicle on the surface, he adds the muriatic or the nitric acid,—agents which, of themselves, are most valuable antilithics.

The Infusum Pareiræ of the London and Edinburgh Pharmacopœias is made by macerating six drachms of *Pareira* in a pint of *boiling water*. The dose of this is from f. ℥j. to f. ℥iij. The Extractum Pareiræ of the same pharmacopœias is prepared in the same manner as the extract of gentian. Its dose is, gr. x. to ʒss; and it is often given along with the Infusion.

3. UVA URSI.

Uva Ursi, in the London and United States Pharmacopœias, is the officinal name for the leaves of the *Ar'butus Uva Ursi*, *Arctostaph'ylos Uva Ursi*, *Bearberry* or *Bear's Whortleberry:* Sex. Syst. Decandria Monogynia; Nat. Order, Ericaceæ; a low evergreen shrub, which is a native of the northern latitudes of Europe, Asia and America. On the American continent, it extends from Hudson's Bay as far southward as New Jersey, whence it is obtained for the market of Philadelphia. (*Wood & Bache.*) The leaves are gathered in autumn, and the green ones are selected. They are apt to be mixed with the *Vaccinium Vitis Idæa* or *Red Whortleberry*, a plant of the same natural family, the leaves of which are minutely toothed, and the under surface dotted; whereas the edges of the genuine leaves are entire and the under surface reticulated. (*Pereira, Christison.*) Moreover, the spurious leaves are deficient in astringency, a remark, which applies to the box-leaf, which is sometimes mixed with it;—the true uva ursi leaf having a bitterish and strongly astringent taste, but no odour except when in powder. It then resembles that of hay. Its virtues, which are mainly dependent upon tannic acid, are yielded to water and alcohol. The tannic acid—as elsewhere observed—is the great astringent principle of vegetables.

Uva Ursi is possessed of the powers of the ordinary astringents, but so far as the author has observed, of nothing more; yet it has all the virtues ascribed to it that have been assigned to Diosma and Pareira. It has indeed, been regarded "as a specific in diseases of the kidneys and bladder at large." "In recent times," says a modern writer, (*Christison,*) "it has been succeeded, as a panacea in urinary diseases by the Pareira brava root—probably"—he gravely adds, "without sufficient reason." Nothing can be more feeble than the testimony, which has been brought forward in favour of its specific affinity for the urinary organs, and accordingly the confidence of surgeons in regard to it is becoming less and less; or at all events their sentiments are highly discordant. (*Pereira.*) As an antilithic it appears to act solely by its tonico-astringent properties.

The dose of the powdered uva ursi is from ℈j. to ʒj, given three or four times a day; but the form usually preferred is the

DECOCTUM UVÆ URSI, DECOCTION OF UVA URSI. (*Uvæ ursi*, ℥j; *Aquæ*, f. ℥xx. Boil to a pint). The dose is from f. ℥j. to f. ℥ij. three or four times a day.

V. DIAPHORETICS.

SYNON. *Diapnoica.*

Definition of diaphoretics—Largely invoked in Therapeutics—Disease not often induced by suppressed perspiration—Modus operandi of diaphoretics—Are indirect agents—How their operation may be aided—Their therapeutical application—Special diaphoretics.

Diaphoretics are defined to be—"agents that augment the function of transpiration."

As it was at one time imagined, that almost every disease, to which mankind are liable, is produced by obstructed perspiration, the class of diaphoretics was extensively employed in medical practice, and numerous agents were admitted into the catalogues of the materia medica, which were supposed to be capable of augmenting the cutaneous exhalation. Even yet, this cause of disease is repeatedly referred to, not only by the unprofessional, but by many of the profession. "Health," says a modern writer, (*Eberle*,) "is very intimately connected with the regular performance of the perspiratory function. Whenever the transpiration by the skin is suddenly checked, more or less derangement of the system is invariably the consequence. That portion of the circulating fluid, which nature designs to be cast off by the cutaneous emunctories, is no longer fit for the purposes of the animal economy; is retained and becomes a source of morbific irritation to the heart and other organs." "Disease," says another writer (*A. T. Thomson*,) "is frequently the consequence of a sudden check to the perspiratory function; means, therefore, have been sought for to restore it; and the substances, classed as diaphoretics, are supposed to have that power."

It may admit, however, of well-founded doubt, whether disease be ever induced by suppression of the cutaneous exhalation. The two great fluids of depuration are the transpiration—cutaneous and pulmonary—and the urine. In summer, the former predominates over the latter, whilst in winter the opposite is the fact. Hence, there appears to be a sort of compensation effected between the two depurations, so that if one be diminished by a change of atmospheric temperature, the other is augmented. For this reason, we should not anticipate extensive morbid results from a general check given to perspiration, were we even ignorant of the impunity, with which we may pass from a heated apartment to the external air, and which follows the use of the cold bath, after the individual has been exposed to a very elevated temperature, as in the Russian vapour-bath. Observation has, indeed, sufficiently shown, that danger is less to be apprehended from such general checks, than from the partial and irregular application of cold and moisture. The danger of having the feet cold and wet, or of sitting with a part of the body exposed to a draught of cold air, is proverbial; yet, if we attempt to explain this by the check given to perspiration, we fail; for the loss of the ordinary depuration, in so small a portion of the body, is obviously insufficient to account for the phenomena; yet, disease is far more apt to be induced, in such case, than when the whole body is exposed to a sudden alternation of temperature from hot to cold, and when the check to the cutaneous depuration ought necessarily to be to a much greater extent. The author has elsewhere remarked, (*Elements of Hygiène*, p. 69,) that there is perhaps in every one, at any particular time, some organ or tissue of the body more disposed to take on morbid action than another; and that, between every part of the capillary surface such an extensive sympathy reigns, that if one part be irregularly and morbidly impressed, such impression vibrates to every part of the system, so that the tissue or organ, most disposed to take on morbid action at the time, assumes it. Hence, if a dozen individuals be exposed to the irregular application of cold and moisture to the feet, they may not all have the same disease induced, because in all there was not, at the time, the same disposition in a particular organ or tissue to the assumption of disease.

This irregular action of the capillaries of the part is the first link in the chain of phenomena, not the obstruction of perspiration. On this head, a modern writer, (*W. F. Edwards*, of Paris,) has expressed himself in a sound and rational manner. The insensible perspiration he regards as a purely physical phenomenon of "evaporation," whilst the sensible "is a loss ordinarily produced by a vital action, in the form of a liquid which transudes." In prosecuting the consideration of this subject, he remarks;—"all that we have hitherto shown on the subject of perspiration will considerably facilitate our examination of a question, which naturally presents itself. Is perspiration susceptible of being suppressed? It is easier to resolve this question with regard to man and other warm-blooded animals, than with respect to the cold-blooded vertebrata. Let us see what is the result of a very low temperature upon warm-blooded animals. We know by the effect of cold upon the sweat, that it diminishes transudation. Now let us suppose, that it may, by its intensity, suppress it altogether, there will remain perspiration by evaporation, which will always take place, however humid the air may be. The high temperature of man, and other warm-blooded animals, warms the air in contact with the body, and changes its hygrometric state by removing it from its extreme of humidity, and consequently occasions evaporation. If, on the other hand, the temperature of the air be raised to an equality with that of the body, at the time that it is saturated with humidity in order to suppress evaporation, then perspiration by transudation is excited, and takes place to such an extent in man and other warm-blooded animals, that the sweat will stream from all parts of the body. We can then, in no case, suppress the perspiration; it will be performed either by evaporation or by transudation. We ought therefore to be careful, how we take literally what we find in medical books respecting suppressed perspiration. There can be no such thing. That there may be suppression of sweat is evident to every one; but it does not follow, that even in these cases, there is no transudation.

"Since it is difficult to assure ourselves directly, whether transudation is ever entirely suppressed in man, and other warm-blooded animals, let us see what the cold-blooded vertebrata will offer on this point. The batrachians are the best adapted to this kind of researches, on account of the nakedness of their skin, of the fineness of its texture, of the copious loss, which may be incurred through its medium, and, consequently, of the relation which their perspiration bears to that of man. On exposing frogs to the temperature of 0° Cent. (32° Fahr.) in humid air, in order to suppress perspiration by evaporation, they have lost by transudation, in different experiments, the thirtieth part of their weight. Transudation is more abundant in these animals than in man, though the latter be placed in circumstances much more favourable. When we consider how sensible these creatures are to cold, how much the activity of all their functions is diminished at a low temperature, and how much they may even then lose by transudation, it is not to be supposed, that cold suppresses this mode of perspiration in man, and the less so from his having a temperature of his own, which varies very little with the changes of the atmosphere, a condition which has a powerful tendency to maintain transudation. It may be very much diminished by the action of cold, but it appears that it cannot be altogether suppressed. It is a remarkable but well known fact, that when life is sinking, and to appearance nearly extinct, the body is covered with sweat —so strong is the tendency to continue this function."

In any mode, consequently, of viewing the subject, it does not appear that we can ascribe any extensive series of morbid phenomena to simple suppression of perspiration. Such being the fact, the indication of restoring suppressed perspiration—if it be admitted at all—must exist much less frequently than has been imagined. Yet there are but few classes of remedies, that are more used, especially by the older practitioners, than diaphoretics, and probably none which are more uncertain in their operation, and on which less reliance ought to be placed. Most of them, too, are agents, which stimulate the heart and arteries, and hence the indiscriminate employment of heating diaphoretics has been productive of much mischief in febrile and inflammatory disorders. In a state of health, any thing, which gives occasion to the greater propulsion of blood into the cutaneous capillaries, will produce diaphoresis. In this way, exercise and external heat exert a diaphoretic agency; but when the capillary action is in a state of exaltation from disease, the same agencies are not followed by a like result. This state of exaltation has to be reduced before diaphoresis can be effected. The same thing is also exhibited in another way. During the heats of summer, the cutaneous capillaries are kept in a state of perpetual erethism, and although the sensible perspiration may be exhaled to a great extent, it would probably be more largely elicited were the erethism less; accordingly, when we take iced water or any iced drink under such circumstances, the refrigerant influence is exerted on the capillaries of the stomach, and, owing to the extensive sympathy that exists between every part of the capillary surface, the cooling influence is at once communicated to the whole capillary system, the erethism is thus reduced, and copious perspiration ensues. Every one must have observed how rapidly the sensible perspiration is thrown out in hot weather after the use of iced drinks. The effect is here diaphoresis, but the remedy operates as a *refrigerant*—a class of agents far more efficacious than diaphoretics. It may be doubted, indeed, whether we have any internal remedies, which are capable of acting as direct diaphoretics; that is, by virtue of specific properties, which they possess over the glandular or diapnogenous apparatus of the skin. Dr. Paris thinks, that mercurials and sulphur act in this way, but the only evidence we have of this is, that they pass off by the skin, and as they emerge from the system in this manner, it would be fair, perhaps, to presume, that they may act on the cutaneous capillaries, but we have no evidence in favour of their producing augmented diaphoresis.

The author, to whom allusion has just been made, has given the following table of what he considers the *modus operandi* of diaphoretics.

"DIAPHORETICS

Occasion their effects—

I. By stimulating the cutaneous capillaries.

A. By external application.
The stimulus of heat, frictions, &c.

B. By medicines which enter the circulation and stimulate the cutaneous vessels by *contact.*
Mercurials—sulphur.

C. By medicines which act on the surface *sympathetically,* through the medium of the stomach.
Cold drinks, &c.

II. By increasing the general action of the vascular system.
Violent exercise—Ammonia—Guaiacum—Alcohol—Warm bath.

III. By relaxing the morbidly constricted mouths of the perspiratory vessels.
Antimonials—Cold affusion—Venesection—Saline diaphoretics."

It has been seen, that the *modus operandi* of cold drinks cannot be referred to any 'stimulation' of the cutaneous capillaries, and the same may be said of the warm bath, which certainly does not operate by increasing the general action of the vascular system. Such may be, and is, the effect of the *hot* bath—aqueous, vapour, or air—but the warm bath acts precisely like the cold, by diminishing the action of vessels. A mistake is often made, and a hot stimulating bath is occasionally administered in violent inflammatory attacks, instead of the warm and soothing,—to the manifest detriment of the sufferer. The application of warmth, in the form of the warm water bath, is one of the most valuable therapeutical agents, which we possess; especially in the inflammatory and spasmodic disorders incident to childhood. At one time, the salutary agency was universally ascribed to the restoration of suppressed perspiration. It is now known to modify the condition of the capillary system, reducing it when over-excited, and producing a beneficial action of equalization in the circulatory movements, so as to diminish the exaltation of vital manifestations in the organ labouring under inflammation or spasm.

In reality, there are no substances, administered as diaphoretics, on whose direct agency any dependence can be placed, unless they are such as are made to come in contact with the cutaneous surface. Diaphoresis follows the employment of many internal means, but the result is produced indirectly. Antimonials, for example, have been much relied upon for "relaxing the morbidly constricted mouths of the perspiratory vessels;" but this result is not produced by any specific action on those vessels, so much as by exciting a new impression on the system, which breaks in upon the cutaneous erethism. Perhaps we have no class of remedies more uncertain in their operation than antimonial diaphoretics, as ordinarily administered. It might indeed be said, that there are no agents so devoid of any beneficial action; yet, if they are given so as to excite nausea, or a state approaching this, diaphoresis often results, but then it is immediately produced by the state of diminished vital activity, occasioned by the remedy acting as a *nauseant*—a set of agents possessed—as has been seen—of the most valuable properties for reducing morbid exaltation of the vital forces. The faith, however, that has existed in antimonials, as usually prescribed, for exerting a febrifuge action, has not been without its advantages. Whilst trust is reposed in them, the feverish invalid is left in quietness, and the irritating system of cathartic after cathartic is, for the time, dispensed with; but that the antimonial is, in many cases, inert, has been sufficiently shown from numerous experiments with the *Pulvis Antimonialis* of the pharmacopœias—a powder introduced as a factitious "*James's Powder*"—which have demonstrated, that the preparation is often almost wholly inoperative, even when given in very large doses. It is rarely employed on the continent of Europe, but confidence is still, although unworthily, reposed in it by many practitioners of this country, and of Great Britain. "The utmost diversity of opinion," says Dr. A. T. Thomson, "exists respecting the utility of this preparation; many practitioners contending that it is perfectly inert, others asserting, 'that it is one of the best antimonials we possess.' From the result of its administration in my own practice, I cannot place any confidence in its diaphoretic powers. If there be much muriatic acid present in the stomach, it may prove active; but in general it displays no influence whatever on the system. It has been given in doses of sixty, eighty, and one hundred and thirty grains without any sensible effect. Its occasional activity may be ascribed to the oxide being accidentally in the state of a protoxide."

The results of the author's observations have led him to conclusions identical with those of Dr. Thomson, yet he can well recollect, how strongly it was urged, by an old and venerated preceptor, to place full reliance upon six or eight grain doses of of this preparation, in cases where a febrifuge was needed, and to be especially careful not to exceed this quantity, lest emesis should be induced.

In every case, in which the skin is hot and dry, and the indication appears to be, to establish diaphoresis, the cause of this condition of the cutaneous exhalents must be inquired into, and, if possible, removed. Hence it is, that the well-instructed practitioner employs indirect diaphoretics rather than such as are esteemed direct. Thus, diminished sensible exhalation takes place from the skin, during the existence of fever or of inflammation, but the physician does not have recourse to any reputed diaphoretic, which acts by exciting the sanguiferous system. He adapts his antiphlogistic remedies, so as to reduce the already too much excited condition of the blood-vessels to the healthy standard, and he finds, when he has removed the internal inflammation, the heat and dryness of the skin subside, and diaphoresis satisfactorily established. Under similar circumstances, a full dose of opium is attended with a similar result. Opium, in a large dose, exerts sedative properties. When, therefore, inflammation is present, sedation is produced by the drug; nervous and sanguiferous excitation are allayed, and the skin becomes cool and moist. Hence it is, that morphia, in large doses, is often so powerfully diaphoretic.

One of the most celebrated diaphoretics, or *sudorifics*,—for the latter term is more frequently employed where the medicine is considered capable of inducing sweating—is a combination of opium with ipecacuanha. Opium, in a small dose, is a stimulant; in a large one, a sedative. Ipecacuanha, in a full dose, is an emetic; in a small one, a nauseant, and, by virtue of the latter property, a diaphoretic. Ten grains of *pulvis ipecacuanhæ et opii—Dover's powder*—contain one of opium, and, under the combined action of the substances in this dose, augmented exhalation from the skin takes place, as surely as after the administration of any internal diaphoretic agent. It has been the fashion to explain its action by supposing, that, whilst the opium increases the force of the circulation, the ipecacuanha relaxes the exhalent vessels, and causes a copious diaphoresis. (*Paris.*) This, however, is an improbable hypothesis, and the true explanation perhaps, is,—that the combined influence of the two agents is exerted on the vascular and nervous systems, so as to reduce inordinate activity; in this way, the erethism of the capillaries, consequent on irritation existing elsewhere, is removed, and the cutaneous exhalation becomes manifest. It cannot be denied, that there may be remedies, which may hurry the circulation, and others that may relax the cutaneous exhalents, but it is not easy to conceive, that they can be readily brought to act simultaneously, and it is easier to account for the induction of diaphoresis, by such compound remedies as the *pulvis ipecacuanhæ et opii*, upon general principles, than by invoking specific influences, of the reality of which we must remain in strong doubt.

It has been already remarked, that nauseants act as the most effective diaphoretics. Their operation is, of course, indirect; their main agency being exerted on the nervous and sanguiferous systems, which they depress.

The action of diaphoretics is aided by the free use of diluents; but much of their operation is to be referred rather to the temperature of the fluid, than to their passing into the blood-vessels, and producing polyæmia. The experiments of Magendie have shown, that if warm fluids be injected into the veins of an animal, a state of artificial polyæmia may be induced, during the existence of which, the pulmonary and cutaneous transpirations are greatly increased. Where, however, there is much erethism present, absorption is but feebly effected. Were it otherwise, inflammatory diseases could hardly fail to be largely augmented by the free use of diluents.

On the whole, then, even in febrile and inflammatory affections, the use of the ordinary internal diaphoretics is uncertain, and generally of no avail; whilst several of them are decidedly injurious by their excitant properties; yet, in many such cases, advantage may be derived from the equalizing influence of the warm bath; and, in minor inflammations, especially of the gastro-pulmonary mucous membrane,—as catarrh,—the good effect of warm diluents, aided by the warmth and quietude of bed, produce an effect of equalization, which is often most salutary. In no disease, perhaps, has the class of medicines, which we are considering, been more extensively employed than in rheumatism. Its pathology has always been connected with suppression of perspiration. Its very name, indeed, denotes a rheum, a defluxion or catarrh, directed to the part labouring under it, and the cause of such defluxion has been almost always referred to some check given to the cutaneous transpiration. This applies more especially to chronic rheumatism, but the reasoning, and the practice founded upon it, have been extended to the acute forms of rheumatism or rheumatic fever, in which the copious exudation from the cutaneous exhalents, notwithstanding the hot skin, is one of the most striking symptoms. Dover's powder has long been a favourite remedy in this disease, and, when given in proper doses, it is often useful, for the reasons previously assigned. The combination is well adapted for diminishing vascular and nervous action; but the indication, in these cases, is surely not to restore suppressed perspiration, but rather to diminish the singular state of erethism, which characterizes this anomalous phlegmasia.

In almost all cases, in which the employment of diaphoretics appears to be indicated, the class of sedatives, or refrigerants, or both, will be found infinitely more advantageous, for reasons already assigned, and to be more particularly expatiated upon, when the *modus operandi* of those divisions of remedial agents comes to be considered.

SPECIAL DIAPHORETICS.

I. *Sedative Diaphoretics.*

1. ANTIMONIALS.

The preparations of antimony, that are alone used as diaphoretics at the present day, are the *tartrate of antimony and potassa;* the *pulvis antimonialis*, and the *precipitated sulphuret of antimony.*

a. ANTIMO'NII ET POTAS'SÆ TARTRAS.—TARTRATE OF ANTIMONY AND POTASSA.

Tartar emetic has been regarded by many as the most certain of the antimonial diaphoretics, and it is assuredly more frequently given than any other. When pushed to the extent of inducing nausea—like other nauseant emetics, it is a true and valuable sedative, yet it is most frequently given in fever so as to produce a febrifuge effect without exciting nausea. In such case, as already remarked, it is an uncertain remedy, and nothing exhibits this more strongly than the discordant testimony in regard to it in continued fever: whilst many writers consider it to be of great service, others speak slightingly of it. "Of all the numberless febrile diseases," says a recent writer (*Christison*), "where antimonial diaphoretics are prevalently given, the only one where my own observation does not concur with that of most others as to their beneficial effects is continued fever. After extensive experience as an hospital physician for twenty years, I must say, that I have seen no substantial reason for the warm commendations of this method of cure by some, either in the marked inflammatory type put on by the disease in the earlier periods, or in the late typhoid form which it has assumed, or in the synochous form in which it appeared in the middle of the term. What may have been, or may yet be, the case in other epidemics, it must be left to others to determine. In the late epidemics of Edinburgh I have seen no good done by it except as a palliative, and not a very trusty one, in abating reaction in the early stages of synochus and typhus."

The ordinary dose of tartar emetic as a diaphoretic is from one-sixteenth to one sixth of a grain given in solution, or in powder. By many, in this country, a combination of the nitrate of potassa, calomel and tartar emetic is prescribed under the name of "*Nitrous powders.*" The usual form for the preparation of these powders is the following. (*Antim. et potass. tartr.* gr. ⅛; *Potassæ nitrat.* ℈ss; *Hydrarg. chlorid. mit.* gr. ¼ ad gr. ½. M. One of these to be given every two or three hours.) They are especially useful, where it is desirable to *touch* the mouth in fever; yet it may be a question, whether there be any advantage from the reputed diaphoretics with which the mild chloride of mercury is combined. In the advanced stages of typhus accompanied with high encephalic excitement, as manifested by loss of sleep, delirium, &c., good effects have resulted from the use of the tartrate combined with opium; yet these are precisely such cases as are benefited by the use of opium singly, and it has been found equally beneficial in encephalic disturbance supervening on other diseases, and associated with adynamic phenomena.

VINUM ANTIMO'NII, ANTIMONIAL WINE. The dose of this solution of the tartrate of antimony and potassa as a diaphoretic is from ten to thirty drops, repeated three or four times in the course of the day. Each ounce of the wine contains two grains of the tartrate.

b. PULVIS ANTIMONIA'LIS.—ANTIMONIAL POWDER.

Dr. James, of London, about the middle of the last century acquired great celebrity for a powder which was known under the name of *James's Powder.* This, on analysis, was found to consist of phosphate of lime, with about an equal quantity of oxide of antimony. In accordance with this analysis, a preparation was introduced into the London Pharmacopœia, which resembles in its ingredients the real James's powder, but differs in their proportion. The London Pharmacopœia has the following directions for its preparation.

Take of *Sesquisulphuret of antimony,* in powder, a pound; *Horn shavings,* two pounds: mix and throw them into a red-hot crucible, and stir constantly until vapour ceases to arise. Rub the residue to powder, and put it into a proper crucible. Then apply heat raised gradually to redness, and keep it so for two hours. Rub the residue into a very fine powder.

By this process the animal matter of the horns is burnt away, and the subphosphate, with a little of the carbonate of lime is left. The sulphur of the sesquisulphuret is expelled by the same agency in the form of sulphurous acid, whilst the antimony takes oxygen from the air, forming antimonious acid, and sesquioxide of antimony. The main constituents, therefore, are antimonious acid and subphosphate of lime. It is of a white colour, tasteless, and devoid of odour.

Antimonial powder is extremely uncertain, as already remarked, (p. 310,) in its operation, and is generally wholly inert; for these and other reasons it has not been received into either of the two last editions of the Pharmacopœia of the United States.

Its ordinary dose is from three to ten grains and more, repeated three or four times in the course of the day. It may be given in pill, or sugar and water.

Some practitioners have more confidence in the quack James's powder; but it, also, is exceedingly uncertain in its operation; and accordingly neither the one nor the other is much used in this country.

c. ANTIMO'NII SULPHURE'TUM PRÆCIPITA'TUM.—PRECIPITATED SULPHURET OF ANTIMONY.

The mode of forming this preparation, in the British Pharmacopœias and in that of the United States, consists in boiling *sulphuret of antimony*, and *solution of potassa* in *distilled water* for three hours, constantly stirring, and occasionally adding distilled water, so as to preserve the same measure. The liquor is then strained, and, while hot, diluted sulphuric acid is dropped in, so long as it produces a precipitate; the sulphate of potassa formed is then washed away with hot water, and the precipitated sulphuret of antimony is dried and rubbed into fine powder.

Several old antimonial preparations were at one time largely employed; one of these was *Kermes mineral.* It is formed by boiling sesquisulphuret of antimony in an alkaline liquid, and allowing a reddish powder,—kermes mineral,—to be deposited on cooling. If to the filtered mother liquor, a dilute mineral acid be now added, the GOLDEN SULPHURET OF ANTIMONY—an orange-red precipitate—is thrown down; and if the acid be added before the kermes mineral has subsided, an orange-red precipitate is deposited, which is the OXYSULPHURET OF ANTIMONY of the London Pharmacopœia,—the GOLDEN SULPHURET OF ANTIMONY of the Edinburgh, and the PRECIPITATED SULPHURET OF ANTIMONY of the United States Pharmacopœia. This substance is insoluble, devoid of smell, and of a slightly styptic taste. It is insoluble in water, but is wholly soluble in nitro-chlorohydric acid, with the evolution of hydrosulphuric acid.

Precipitated sulphuret of antimony is not inert. It has, indeed, been given as an emetic, but like the Pulvis antimonialis, is so uncertain in its operation, that it is rarely used. It was an ingredient in *Plummer's Pill*, and is therefore still retained in the *Pilulæ Hydrargyri Chloridi Compositæ* of the British Pharmacopœias. The dose as a diaphoretic is from two grains to ten, repeated once or oftener in the day.

2. IPECACUANHA.

The remarks, made in regard to the tartrate of antimony and potassa as a diaphoretic, are equally applicable to the article now under consideration. When given alone, it is an extremely uncertain remedy; but when carried to the extent of inducing nausea, it is a valuable sedative, and, by allaying the excited organic actions, produces indirectly diaphoresis in febrile and inflammatory diseases. It is often, however, administered in such cases in so small a dose as to exert probably no action whatever, whilst at the same time, the disease is treated upon general principles, and successfully.

The dose of powdered Ipecacuanha as a diaphoretic is from half a grain to a grain; with such view, however, it is most commonly prescribed in conjunction with opium as in the officinal preparation:—

PULVIS IPECACUANHÆ ET OPII, POWDER OF IPECACUANHA AND OPIUM. (*Ipecac.* pulv.; *Opii*, pulv. āā ʒj; *Potassæ Sulphat.* ℥j.) This is known in the shops as *Dover's powder*, being an imitation of a well known formula, already referred to, which was used by Dover as a diaphoretic. The sulphate of potassa probably exerts little if any action on the economy. It serves a useful pharmaceutical purpose, by virtue of its hardness,—enabling the other ingredients to be minutely divided. Of the *modus operandi* of this compound powder, the author has already spoken (p. 310). It is very much used by many practitioners and is doubtless often given in cases for which it is by no means appropriate. It is best adapted for those in which the concentration of vital activity in some internal organ is not excessive; and where the indication appears to be—to allay inordinate action and to procure rest. Hence, a full dose in adynamic and ataxic fever is often very beneficial; at the commencement, too, of minor inflammations, as catarrh, sore-throat, &c., when aided by diluents, it exerts an equalizing agency, inducing general diaphoresis, and, in this manner, breaks in upon the hyperæmia. In cases of acute rheumatism, it is freely exhibited, and some trust to it entirely throughout that painful malady. It must be borne in mind, however, that acute rheumatism is generally a self-limited disease,—running its course with but little modification from the remedies ordinarily prescribed; and when the Pulvis Ipecacuanhæ et Opii seems to be beneficial, it is less, perhaps, from its diaphoretic, than its soothing agency on the nervous system, which is so much implicated in that singular affection.

It must be borne in mind, that when given in a large dose, the ipecacuanha may occasion vomiting; and hence it will rarely be retained where nausea, or a tendency to it, exists. For the same reason, diluents, which greatly promote its action, and which are themselves diaphoretic under certain circumstances, cannot be freely administered soon after a full dose of the powder has been taken. Where, for example, ten grains of the powder have been administered at bed-time to induce diaphoresis, as in an ordinary case of catarrh, it may be well to wait an hour, and then to give warm wine whey, or a more simple diluent,—as tea or gruel.

The ordinary dose of the pulvis ipecacuanhæ et opii is ten grains; which may be repeated in the course of three or four hours. Tea or sugared water may be the vehicle. Ten grains contain one of opium and one of ipecacuanha; but the former is probably the most important constituent.

VINUM IPECACUANHÆ, WINE OF IPECACUANHA, (p. 217.) The dose of this officinal preparation, as a diaphoretic, is from ♏x to f. ℥ss; and it not unfrequently forms part of diaphoretic mixtures, prescribed in febrile and inflammatory affections. When associated with the tincture or wine of opium, its action resembles that of the preparation last described.

3. OPIUM.

The effects of this valuable drug on the nervous system generally are explained under Narcotics. On the nerves of the skin, its agency is shown by a sense of itching or pricking over the surface of the body, and occasionally by a cutaneous eruption. When taken in very large sedative doses, all its preparations—but especially those of morphia—according to the author's experience, induce diaphoresis; and where opium has been taken for the purpose of destroying life, the perspiration induced by it has been, at times, excessive. In a fatal case, the sheets of the bed were completely soaked to a considerable distance round the body. (*Christison.*)

The effects of opium on the general system—as elsewhere shown—are altogether relative, and dependent upon the dose. In a small dose, it is excitant; in a large dose, sedative; and, accordingly, there are pathological conditions in which good effects might result from it in a large dose; whilst the same morbid condition might be aggravated by a smaller dose. For example, in febrile and inflammatory cases, a small dose might add to the existing evil, and render the skin more hot and dry, whilst a larger dose might reduce the organic actions, and thus prove indirectly diaphoretic. The reader is, however, referred to another part of this work for a farther exposition of these views, the accuracy of which has been recently admitted.' (*Spillan.*)

Opium is rarely, however, administered alone as a diaphoretic. It is generally combined with ipecacuanha, or the tartrate of antimony and potassa. See Pulvis Ipecacuanhæ et Opii, (p. 316.)

II. *Excitant Diaphoretics.*

4. LIQUOR AMMO'NIÆ ACETA'TIS.—SOLUTION OF ACETATE OF AMMONIA.

Solution of acetate of ammonia, formerly called *Spirit of Mindererus*, is best prepared by saturating *diluted acetic acid* with *carbonate of ammonia.* If quite neutral, it produces no effect either on turmeric or on litmus paper: when pure, it is entirely colourless.

Difference of sentiment has existed amongst observers in regard to this solution, as to whether it be excitant or sedative; nor is the difference confined to this point. Whilst some have the greatest confidence in it as a febrifuge, others consider it to be devoid of action on the economy. Four ounces were taken at once, and, soon afterwards, four ounces more, without any sensible effect. (*Cullen.*)

This is one of the articles which the author sometimes prescribes in fever, but more from its serving a temporizing purpose, than for any marked febrifuge power which he considers it to possess. It is often prescribed in other diseases of excitement, sometimes alone, but frequently along with antimonials, nitrate of potassa, &c. As in the case of other diaphoretics, its action may be promoted by the use of diluents, and by external warmth.

The ordinary dose is from f. ʒss. to f. ℥iss, which may be repeated four or five times in the day.

5. AMMO'NIÆ CAR'BONAS.—CARBONATE OF AMMONIA.

Carbonate of ammonia—as elsewhere stated—is an active excitant; and, like other excitants, proves diaphoretic under certain circumstances. It is rarely, however, given as a diaphoretic alone, and not often in combination. Associated with opium, it is occasionally prescribed in protracted ataxic and adynamic fevers; and in acute rheumatism, it has been given by some in association with guaiac, but on no very rational principle: accordingly, at the present day, it is by no means frequently used. It is recommended, that its diaphoretic operation should be assisted by diluents and warm clothing, which are themselves diaphoretic agents.

The dose as a diaphoretic is from gr. x. to ℈j; and a good vehicle for its administration is almond emulsion. (*A. T. Thomson.*) Sugared water answers, however, every purpose.

Liquor ammoniæ or Solution of ammonia, is administered by some as a diaphoretic, under the same circumstances as carbonate of ammonia. The dose is ♏iv. to ♏xx. in sugared water, or properly diluted.

Citrate of ammonia, Ammoniæ citras, which is commonly prepared by saturating the ammonia of the carbonate of ammonia with fresh lemon-juice, is occasionally used as a diaphoretic both in the still and effervescent state.

6. EUPATO'RIUM.—THOROUGHWORT.

Thoroughwort or *Boneset*, **Sex. Syst.** Syngenesia Æqualis; **Nat. Ord.** Compositæ Corymbiferæ, is an indigenous plant, common in almost all parts of the United States; inhabiting moist places, and flowering from the middle of summer to the close of October. The tops and leaves are officinal in the Pharmacopœia of the United States.

No analysis has been made of it; but its medical virtues, which appear from the taste to consist in part in bitter extractive, are communicated to water and to alcohol.

The virtues of eupatorium as a diaphoretic are esteemed by some to be very powerful, and to succeed when other excitant diaphoretics have failed. Hence it has been given freely in acute and chronic rheumatism. The tonic properties, which it possesses at the same time, render it especially adapted for cases in which a diaphoretic and tonic influence is demanded. In very large doses it may prove emetic.

As a diaphoretic, it is rarely given in substance. The ordinary dose of the powder is from ℈j to ʒss. The infusion is generally prescribed.

INFU'SUM EUPATO'RII, INFUSION OF THOROUGHWORT. (*Eupator.* ℥j; *Aq. bullient.* Oj.) This should be taken warm, and freely, the patient remaining in bed.

Eupato'rium Teucrifo'lium, or *Wild Horehound,*—which grows in low wet places, is especially abundant in the southern states, and flowers from August to November,—possesses similar virtues with E. Perfoliatum. The whole herb was formerly officinal in the secondary list of the Pharmacopœia of the United States.

7. SPIR'ITUS ÆTHERIS NI'TRICI.—SPIRIT OF NITRIC ETHER.

This preparation, whose general properties are given elsewhere (p. 277)—has been described as possessing the ordinary excitant properties of the ethers and alcohol. It may, consequently, prove diaphoretic, and be beneficial in fevers of the adynamic kind. It is not so easy to see how it can be refrigerant, although it is so regarded by many. There is, indeed, no single article in the catalogues of the Materia Medica, which is more frequently prescribed by the routinist in febrile cases in general. Fortunately, it is never given in large quantities, and, therefore, not much harm results; yet it is difficult to see how it can be appropriate where the vascular action is excessive as in our ordinary febrile and inflammatory affections. By many it is associated with the liquor ammoniæ acetatis; by others with antimonials—the latter not being a very philosophical combination, as one of the diaphoretics is excitant, the other sedative. With more propriety it has been advised in combination with a small quantity of the compound spirit of ammonia, (*Duncan,*) and prescribed in the low stage of fevers. Often, perhaps,—especially in the febrile affections of children,—it is prescribed in the dose of a few drops, without the practitioner having much, if any, confidence in its diaphoretic powers, but where it is necessary to do something.

The dose of the spirit of nitric ether, as a diaphoretic, is f. ʒss. to f. ʒij. in water.

8. POTAS'SÆ CITRAS.—CITRATE OF POTASSA.

Citrate of potassa is never kept in the shops. It is readily made by saturating the potassa of carbonate of potassa with citric acid; but the salt is deliquescent, and crystallizes with difficulty. A solution of it is very frequently formed extemporaneously; and the Pharmacopœia of the United States, for 1842, contains two formulæ for the

LIQUOR POTAS'SÆ CITRA'TIS, or **SOLUTION OF CITRATE OF POTASSA;** the one made with fresh lemon-juice, and the other with citric acid. (*Succ. limon.* recent. Oss; *Potassæ carbonat.* q. s.; or, *Acid. citric.* ℥ss; *Ol. limon.* ♏ij; *Aquæ* Oss; *Potassæ carbonat.* q. s.) These formulæ are properly, perhaps, introduced, seeing that the mixture is so often prescribed, in order that uniformity may be observed in its preparation. It is the well known *neutral mixture*, which, in one form or other, has been employed in febrile cases for ages. When properly prepared, it is merely a solution of neutral citrate of potassa flavoured with lemon-peel, and has no more diaphoretic virtue than a similar solution of any of the neutral salts. Yet it is constantly administered in febrile cases, and as these generally do well under the observance of a course, which avoids all unnecessary irritation, and removes, as far as possible, disturbing influences when they occur, a portion of the good effects is very apt to be ascribed to any agent which is administered at the same time. The *neutral mixture* or *saline mixture*, as it has been likewise called, has been extensively used by the author; but he has long abandoned its employment, except where it was necessary to carry out a temporizing method of treatment; and in these very cases, it is much preferable to give the mixture in a state of effervescence, in order that the gently excitant influence of the carbonic acid may be exerted on the stomach. Still, for this purpose, the use of the *mineral water* or *soda water* of the shops is to be preferred. When kept cold—ice cold—it is an admirable refrigerant, and exceedingly grateful, much more so than the neutral mixture, no matter how well the latter may be prepared. The author has, however, elsewhere described his views in regard to the agency of REFRIGERANTS in febrile and inflammatory affections.

9. CAM'PHORA.—CAMPHOR.

Camphor—whose general properties are described under EXCITANTS—by virtue of its excitant powers, is diaphoretic; yet it is rarely given alone. Combined with antimonials, as the tartrate of antimony and potassa, it is prescribed occasionally in fevers of the adynamic kind; yet the combination seems scarcely to be philosophical, inasmuch as one article is diaphoretic by virtue of its excitant, the other by virtue of its sedative agency. It has been elsewhere shown, that in long protracted fevers of the adynamic and ataxic kind, it is often associated with opium.

The ordinary dose of camphor as an excitant diaphoretic, is ten grains, given in the form of pill or emulsion. Its officinal preparations are scarcely ever prescribed as diaphoretics.

10. GUA'IACUM.—GUAIAC.

Both the wood of the *Gua'iacum officina'lē*—Gua'iaci Lignum; and the concrete juice—Guaia'ci Resi'na, *Guaiac*—are officinal in the Pharmacopœias of Great Britain and this country. They have, indeed, been employed in Europe, where they were introduced by the Spaniards soon after the discovery of the New World.

Guaiacum officinale; Sex. Syst. Decandria Monogynia; Nat. Ord. Zygophyllaceæ, (*Lindley,*) is a large tree, which is indigenous in the West Indies, particularly in Saint Domingo and Jamaica. On the continent of Europe, the bark is much used, and it appears to contain more of the virtues of the tree than the wood.

1. **GUA'IACI LIGNUM, GUAIACUM WOOD,**—is *Lignum Vitæ*, an extraordinarily hard and tough wood, which is used for making pestles, block-sheaves, &c. It is imported in logs or billets, consisting of a broad grayish-yellow alburnum, and a dark greenish brown or greenish black duramen, the latter of which is the denser of the two. The specific gravity of the whole is 1.333, so that it sinks in water. Guaiac wood of the shops, *Rasu'ra Gua'iaci*, consists of the turnings from the workshop of the turner, and is a mixture of both alburnum and duramen. It is almost devoid of smell, unless when rubbed, rasped or heated, when it has an aromatic odour. It excites a bitter, acrid biting taste on the palate. When analyzed by Trommsdorff, it was found to contain 26 per cent. of resin—probably the guaiac, to be described presently, with a bitter piquant extractive matter, which was most abundant in the alburnum; the resin abounding in the central wood or duramen. The central wood has generally been preferred, and the alburnum has even been directed to be discarded by some, under the idea that its activity is altogether dependent upon the resin it contains. This, however, as has been remarked by a recent pharmacologist, (*Christison,*) is a mistake; and even if we were not to accord with him, that the more acrid alburnum ought, perhaps, to be preferred, we might still object to the rejection of the acrid principle.

Guaiacum yields its virtues to both alcohol and water, but not equally well to both. The resinous matter is, of course, not wholly imparted to the latter. Alcohol has been found to dissolve 21 per cent.; boiling water 10 per cent. according to one experimenter; 17, according to another; yet, the most favourite preparations of guaiacum wood have been at all times decoctions; which would rather favour the idea, that the activity may be greatly resident in the acrid principle.

Guaiacum wood is an excitant diaphoretic, less perhaps on account of the acrid extractive which it contains than of the resin, which is nearly insoluble in water. It is rarely, however, administered as a diaphoretic. It has been given in chronic rheumatism in the form of decoction; and has frequently been prescribed—as will be seen elsewhere—as a eutrophic, in diseases of the system of nutrition, as in scrophulous, syphilitic and syphiloid affections. Where the active excitant properties of guaiacum are wanted, the resin is almost always directed.

A simple *decoction* of the guaiacum may be made by boiling an ounce of the shavings or turnings, in a pint and a half of water down to a pint. To produce diaphoresis, this should be given warm, in the dose of four ounces repeated every five or six hours if necessary.

Guaiacum wood is an ingredient in the *Decoctum sarsaparillæ compositum*, and the *Syrupus sarsaparillæ compositus* of the Pharmacopœia of the United States.

2. **GUA'IACI RESI'NA, GUAIAC,** or, as it has been erroneously called, *Gum guaiac*, is an exudation from the tree, spontaneously or by means of incisions. It is obtained, also, by taking billets of the wood, boring a hole lengthwise through them, and putting one end in the fire; the other being so placed, that the melted resin, which runs through the hole as the wood burns, may be received into a calabash. This appears to be the process usually followed; but it is likewise obtained in small quantities by boiling chips or sawings of the wood in salt water, when the resin swims on the top and may be skimmed off. The salt is added to raise the boiling point of the water.

Guaiac, as found in the shops, is usually in irregular lumps, often containing chips of wood and other impurities. These are of a brownish red or brownish yellow colour at the surface, when fresh; but they become greenish on exposure to the air. The fracture is brilliant and resinous. Its specific gravity is about 1.23. When rubbed, it has a slight balsamic odour; with little taste, but leaves a sense of heat and pungency in the mouth. The whole of the resin is soluble in alcohol; the impurities being alone left. Water dissolves about 9 per cent.; and the solution has a sweetish taste. The soluble matter is probably the extractive, which Brande found to exist in it in the proportion of 9 per cent. The resin, considered by some to be peculiar, and which has been called *Guaiacin* and *Guaiacic acid*, forms, according to the same analyst, 91 per cent. Ether acts less energetically on guaiac than alcohol, and the fixed and volatile oils scarcely at all. This last circumstance enables an adulteration, which is sometimes practised on the continent of Europe, to be detected. The resin of the pine or colophony is coloured green, and mixed with it; and the adulteration is detected by the partial solubility of the suspected article in hot oil of turpentine, which dissolves the colophony, but does not act on the guaiac. It exhales, also, a terebinthinate odour when heated.

Like the wood of guaiacum, the resin is possessed of excitant properties, and, when aided by warm drinks—the patient being kept in bed—it proves diaphoretic. It is generally, however, associated with nitrate of potassa, ipecacuanha and opium, or antimonials; and is most frequently prescribed for this purpose in acute rheumatism after the more active period has passed away, and in chronic rheumatism. In such cases it is, at times, arbitrarily combined with sulphur. It has likewise been given, on account of its excitant properties, in chronic atonic gout.

The dose of the powdered guaiac is from gr. x. to ʒss., given in the form of pill or bolus. The London and Edinburgh Pharmacopœias have a MISTURA GUAIACI or *Guaiacum Mixture*, which, according to the former, is composed of *Guaiac*, ʒiij; *Sugar*, ℥ss; *Mucilage of gum arabic*, f. ℥ss; *Cinnamon water*, f. ℥xix. The guaiac is rubbed with the sugar; then with the mucilage; and to these, whilst rubbing, the cinnamon water is gradually added. The dose is f. ℥ss. to f. ℥ij. two or three times a day.

TINCTU'RA GUA'IACI, TINCTURE OF GUAIAC. (*Guaiac.* pulv. ℔ss; *Alcohol*, Oij.) This tincture is not unfrequently given in the rheumatic and gouty cases referred to above. When mixed with water, the guaiacum is separated. Still it may be taken in this manner, but the best plan is to mix the tincture with mucilage before the water is added, and sweeten with sugar, as in the following form:—℞. *Tinct. guaiac.*, ʒvj; *Mucilag. acaciæ*, ℥ss; *Aquæ cinnam.*, vel *Aquæ pur.*, ℥ivss.—M. Dose, a fourth part four times a day. The ordinary dose of the tincture of guaiac is f. ʒj. to f. ʒiij.

TINCTU'RA GUA'IACI AMMONIA'TA, AMMONIATED TINCTURE OF GUAIAC. (*Guaiac.* pulv. ℥iv; *Spirit. ammoniæ aromat.*, Oiss.) In consequence of the addition of the aromatic spirit of ammonia, this tincture is, of course, more excitant than the preceding. It is applicable, however, to the same cases, and requires the same admixtures as the simple tincture. The dose is f. ʒj. to f. ʒij.

11. MEZE'REUM.—MEZEREON.

The mezereon of the shops is the bark of *Daphne meze'reum* and *Daphne gnid'ium;* Sex. Syst. Octandria Monogynia; Nat. Ord. Thymelaceæ. (*Lindley.*) The British colleges refer it entirely to *Daphne mezereum*, *Common mezereum*, or *Spurge Olive*, a shrub which is common in shady woods throughout central and northern Europe, as well as in the northern parts of Asia, and is generally regarded to be indigenous in Great Britain. Dr. Christison, however, considers it a 'doubtful native' of that country. It is occasionally seen in the gardens of this country, being much admired for its beautiful fragrant pink flowers, and its splendid clustered scarlet berries. There is a variety, however, with white flowers, and with berries of a yellow or orange colour. It flowers from February to April inclusive, according to the greater or less temperature of the climate.

In England and Scotland, the bark of the root is alone employed; in this country, the bark of the stem is recognized, which is imported from Germany. It appears to be immaterial which is employed; such, at least, would seem to be the opinion of the framers of the Dublin and United States Pharmacopœias. Others, however, consider the root bark to be more active. (*Christison.*) It is commonly collected in the spring, from the root, where the root bark is employed, or from the bark of the stem and larger branches—as in Germany—when it is folded into small bundles, and dried for medical use. As we meet with it in the shops, it is in strips of greater or less length, folded in small bundles. It is tough, pliable and fibrous, of a brown colour externally, and white and cottony within. Its taste is sweetish at first, but this is soon followed by great acridity. It has no smell when dried, but when fresh, the odour is faint and unpleasant.

Mezereon yields its virtues to water. These seem to be referable to an acrid resin, which there is some reason to suppose is a compound of an acrid, vesicating, fixed oil and another substance, and which is made soluble in water by means of other constituents of the bark.

All the parts of the mezereon are highly acrid, so that—as elsewhere shown—when they are applied to the skin, they excite irritation and vesication. When taken internally, they are, therefore, powerfully excitant, and, in large doses, acrid poisons.

Like guaiacum wood, it has enjoyed reputation as a eutrophic or alterative in the treatment of syphilitic and syphiloid diseases, and in chronic cutaneous affections, and morbid states of the system of nutrition in general. Its virtues in these relations are, however, treated of in another place. Like guaiacum wood, again, it has been given in rheumatism and gout as an excitant diaphoretic, but it is not much employed. A simple **DECOCTION OF MEZEREON** is officinal in the Edinburgh and Dublin Pharmacopœias. It is prepared of *mezereon bark*, in chips, ʒij; *liquorice root*, bruised, ℥ss; *water*, Oij, boiled down to a pint and a half. The dose of this in chronic rheumatism is f. ℥iv to f. ℥viij, two or three times a day.

Mezereon is an ingredient in the *Decoctum Sarsaparillæ compositum* of the Pharmacopœia of the United States.

12. SAS'SAFRAS RADI'CIS CORTEX.—BARK OF SASSAFRAS ROOT.

This drug—as elsewhere shown—is excitant by virtue of its essential oil; and, like other excitants, may—under certain circumstances—prove diaphoretic. Dr. Wood remarks, that "its possession of any peculiar tendency to the skin, independently of its more excitant property, is quite doubtful." This would apply perhaps to all excitant diaphoretics which probably act—as the author has endeavoured to show—in all cases indirectly.

When taken in the form of hot infusion or tea, and aided by the warmth of bed and warm drinks, this drug certainly proves diaphoretic, and might, therefore, be given in incipient catarrhs, and in slight local inflammations, with advantage. It has, likewise, been prescribed in chronic rheumatism; and—as will be elsewhere seen—has formed part of diet-drinks administered in syphilitic and other *vices* of the system of nutrition. It is an ingredient in the *Decoctum Sarsaparillæ compositum* of the Pharmacopœia of the United States; although its volatile oil cannot fail to be driven off during the boiling.

The **OIL OF SASSAFRAS, OLEUM SASSAFRAS**, is employed in the same cases as the sassafras itself, and is an ingredient in the *Syrupus Sarsaparillæ compositus* of the Pharmacopœia. Its dose is from ♏ij to ♏x on sugar, or in some warm fluid.

13. MELIS'SA.—BALM.

The leaves of *Melissa officinalis* or *Common Balm;* Sex. Syst. Didynamia Gymnospermia; Nat. Ord. Labiatæ—are officinal in the secondary list of the Pharmacopœia of the United States. The plant is a native of the south of France; but has been introduced into this country, where it is cultivated for use in the gardens. The flowers appear in July, prior to which the plant should be gathered.

Balm has an aromatic bitter taste, and a strong peculiar odour, which is preserved by the dried plant, provided the desiccation be accomplished quickly; but is lost in time. On analysis, it yields volatile oil, which resembles in smell the oil of lemons,—resin, bitter extractive matter, gum, tannic acid, and woody fibre. The volatile oil is not in great quantity. The leaves yield their virtues to hot water.

Infusion of Balm or *Balm Tea* is stimulant by virtue of its essential oil; but as this is only in quantity sufficient to afford an agreeable flavour to the infusion, it cannot have much remedial agency. In domestic practice, when given hot, it has been esteemed an excitant diaphoretic; but the effects are probably referable to the hot water. The author has often seen it exhibited; and is disposed to arrive at this conclusion. It may be given in catarrhal and other affections in which a gentle excitant influence on the skin is considered to be indicated.

14. ASCLE'PIAS TUBERO'SA.—BUTTERFLY WEED.

The root of *Butterfly Weed*, or *Pleurisy Root*, is in the secondary list of the Pharmacopœia of the United States. It belongs, in the Sex. Syst., to Pentandria Digynia; and is in the Nat. Ord. Asclepiadeæ. This species of Asclepias flourishes in every part of the United States, and flowers in June and July—the flowers being of a beautiful reddish orange colour. It is especially abundant in the southern States.

The root, as seen in the shops, is large and irregularly tuberous; of a brown colour externally, and white and striated within. In its fresh state, it has a nauseous subacrid taste. Its virtues are imparted to boiling water.

Asclepias tuberosa belongs, doubtless, to the class of excitant diaphoretics; and, in large doses, is said to be cathartic. It has been prescribed in catarrh, and in inflammatory affections of the chest in general, especially after blood-letting; and, in consequence of its fancied efficacy in pleurisy, especially, has received one of its appellations.

The dose of the powdered root is gr. xx to ℨi, taken three or four times a day; but this is not the best form as a diaphoretic. The decoction or infusion is generally employed for this purpose in the proportion of one ounce of the root to a quart of water, the dose being a teacupful every three or four hours, taken warm, and the patient being kept in bed, and warm diluents allowed.

15. XANTHOX'YLUM.—PRICKLY ASH.

Xanthoxylum is the bark of *Xanthox'ylum Fraxin'eum;* Sex. Syst. Diœcia Pentandria; Nat. Ord. Terebinthaceæ,—Xanthoxyleæ, (*Lindley,*) a native of the United States, excepting of the southern portion, growing in woods and in moist shady places; and flowering in April and May.

The bark, as met with in the shops, is in quilled pieces, with an ash-coloured epidermis; that of the small branches having strong prickles. It is very light and brittle; nearly without smell, and of a taste sweetish at first, and slightly aromatic, and afterwards bitterish and acrid. Its virtues are communicated in part to boiling water. On analysis it was found to contain volatile oil, a greenish fixed oil, and resin as its chief constituents. (*Staples.*)

Xanthoxylum belongs obviously to the class of excitant diaphoretics, and is considered to resemble, in its action, mezereon and guaiac. It has been administered in similar cases, and is said to enjoy considerable reputation in chronic rheumatism. (*Prof. Bigelow,* of Boston.)

The dose of the powder is gr. x to ʒss, given three or four times a day. It is sometimes directed in the form of decoction,—an ounce of the drug being boiled in three pints of water to two: a pint of this is taken in divided doses during the day. Boiling can scarcely fail, however, to dispel some of its active constituents, and, therefore, cannot be a good form of preparation.

Xanthoxylum is in the secondary list of the Pharmacopœia of the United States.

Besides the excitant diaphoretics already described, the Pharmacopœia of the United States has the following in its secondary list.

16. Ara'lia Spino'sa, *Angelica Tree Bark. Aralia Spinosa, Angelica Tree, Toothache Tree,* or *Prickly Ash;* Sex. Syst. Pentandria Pentagynia; Nat. Ord. Araliaceæ, is an indigenous shrub, which grows chiefly in the southern and western states, and is cultivated in the gardens to the north as an ornamental plant. It flowers in August and September.

The bark is generally given in decoction, (*Aral. spinos.* ℥i; *Aquæ,* Oiss. Boil to a pint. Dose f. ℥iss to f. ℥ij. three or four times a day,) in chronic rheumatic cases.

17. Arum, *Dragon Root, Indian Turnip,* is the cormus of *Arum Triphyllum, Dragon Root, Indian Turnip,* or *Wake*

Robin; Sex. Syst. Monœcia Polyandria; Nat. Ord. Aroideæ,—Araceæ, (*Lindley.*) The plant is indigenous and common in the United States, and, like every species of arum, contains an acrid principle, when fresh, which can be driven off by heat, and is not imparted to water or alcohol, the ordinary pharmaceutical menstrua. By drying, the principle is lost, and the root becomes inert, containing a large quantity of starch, which can be separated from it and taken as an aliment. It is sometimes used, when fresh, as a diaphoretic and expectorant. The recently dried root is usually given, but it has not much efficacy. The dose is ten grains.

18. Car'thamus, *Dyers' Saffron.* The flowers of *Car'thamus tincto'rius, Dyer's Saffron, Bastard Saffron* or *Safflower;* Sex. Syst. Syngenesia æqualis; Nat. Ord. Compositæ Cinarocephalæ—a plant, which is indigenous in Egypt and the Levant, but is cultivated in Europe and in this country, where it bears the name of *American Saffron*—are sometimes administered in warm infusion, (*Cartham.* ℥ss, *Aquæ,* Oj,) as a diaphoretic, in domestic practice, to favour the eruption of the major exanthemata. They are rarely prescribed by the physician; and the same may be said of

19. Crocus, *Saffron;* the stigmas of *Crocus sati'vus, Autumnal Crocus;* Sex. Syst. Triandria Monogynia; Nat. Ord. Iridaceæ;—a native of Asia Minor, and Eastern Europe; but cultivated in various parts of the world. Saffron is in the primary list of the Pharmacopœia of the United States, but only because it enters as a colouring agent into various preparations; in some of which it is retained as a relic of antiquity, not because of any valuable remedial virtues. In domestic practice, it is still given in the same cases as the carthamus, in the form of *Saffron Tea.* Its nominal dose, is gr. x to ʒss; but it is almost inert.

It enters into the *Pilulæ Aloës et Myrrhæ,* the *Tinctura Aloës et Myrrhæ;* the *Tinctura Cinchonæ Composita,* and the *Tinctura Rhei et Sennæ,* of the Pharmacopœia of the United States.

20. Sambu'cus, *Elder Flowers.* The flowers of *Sambu'cus Canaden'sis,* or *Common Elder;* Sex. Syst. Pentandria Trigynia; Nat. Ord. Caprifoliaceæ; a shrub, which is very common in the United States, flowering from May to July, are sometimes used as a diaphoretic in the form of infusion. They contain a small quantity of volatile oil, which may be obtained by distillation with water; constituting the *Aqua Sambuci,* or *Elder Flower Water* of the British Pharmacopœias, which is used to flavour mixtures and emulsions.

III. *Topical Diaphoretics.*

21. CALORIC.

Along with the internal agents already described, caloric, in various forms of baths, is often employed as a topical diaphoretic. Of the effects of baths on the animal economy in health, mention has been made elsewhere. (See the author's *Elements of Hygiène,* p. 406; Philad. 1835.) It remains to speak of them here as therapeutical agents of the diaphoretic class.

a. WARM AIR BATH.

Air, when heated to from 85° to 100° of Fahrenheit's scale, and placed in contact with the cutaneous surface, is a gentle excitant to the secretory apparatus of the skin, and occasions copious perspiration. When heated to a greater degree, it forms the HOT AIR BATH, which, in place of inducing diaphoresis, causes a degree of excitement, that arrests the secretion. Warm air has been applied in various ways; either by raising the bed-clothes from the body, by means of a wicker cradle, and then allowing the tube from a lamp to pass under the bed-clothes, or, by burning alcohol in a cup or saucer under the same; in either case, the patient's head and neck being outside the bed-clothes. It might be applied also by means of one of the ordinary fumigating apparatuses, in which vapours are made to come in contact with the body; or by heating the air of an apartment, by means of a cockle or some appropriate stove. Dry heated air is not, however, inhaled with entire impunity in all cases. It is greedy of moisture, and, where the lungs are diseased, may occasion much distress in respiration. At the temperature of 85° to 90°, applied to the surface in either of the two first modes, it is said to be not stimulating,—to have a soothing effect on the nervous system,—and to be "more certainly productive of sweating than either the warm water bath or the vapour bath." (*A. T. Thomson.*)

A bath of this kind has been found useful in chronic rheumatism, and in various neuralgic affections of deep-seated parts; stiffness of the joints, &c. It is said, also, to have exerted a beneficial agency in cutaneous affections, especially of the squamous kind. Where the blood has receded from the surface, as in cases of congestive fever, or in spasmodic cholera, the bath is rendered more excitant by elevating the temperature. It then becomes a true excitant, and, accordingly, is treated of under another head. (See EXCITANTS.)

b. WARM VAPOUR BATH.

The warm vapour bath holds a medium place between the last and the warm water bath. The vapoury medium is a better conductor of heat than air, and worse than water; hence its temperature, to produce analogous effects, must be higher than that of the warm water bath. The vapour bath differs, too, according to the mode in which it is applied. In the case of the *Russian vapour bath*, the whole body is exposed to the vapour, and it is of course inhaled into the lungs. In other cases, the vapour is made to come in contact with the whole of the body except the head,—none passing into the lungs. In another work, already referred to, (*Elements of Hygiène*, p. 72,) the author has described the arrangement and effects of the Russian bath, which is used mainly as a hygienic agent.

Owing to these differences between the vapour bath and the warm water bath, it has been laid down, that the temperature of the former should always exceed that of the latter. If, however, the whole body be immersed in vapour, so that it is inhaled, it is recommended, that the temperature should be a little less than if the body alone were exposed to it, as the inhalation of vapour arrests the cooling process of evaporation from the lungs.

The following is given on excellent authority (*Forbes*) as a comparative view of the heating powers of water, and of vapour, according as the latter is breathed or not.

	WATER.	VAPOUR.	
		Not breathed.	Breathed.
Tepid Bath,	85°— 92°	96°—106°	90°—100°
Warm Bath,	92°— 98°	106°—120°	100°—110°
Hot Bath,	98°—106°	120°—160°	110°—130°

In the work already cited, and in another part of the present, the author has stated the effects of the hot vapour bath to be—like those of the hot water bath—powerfully excitant, and, therefore, not properly falling under consideration here. Those of the warm vapour bath are moderately excitant, but powerfully diaphoretic, producing a general equalizing influence, followed by a feeling of languor, and by somnolency. Hence, it may be used with marked advantage in slight inflammatory affections, especially in those of the gastro-pulmonary mucous membrane. In such cases, it would obviously be better, that the bath should be so administered, that air loaded with vapour should be received into the air-passages. It may also be of service in dry chronic cutaneous eruptions, and in rheumatic affections; although in these last, the hot vapour bath proves more serviceable.

For therapeutical purposes, the patient may be covered with an oil silk garment, which ties round the neck, and is made to fall at a distance around him. A tube, connected with a kettle of boiling water, placed over a spirit lamp, may then be passed under the oil cloth at such a distance from the patient's body as to prevent his being scalded; and in this way warm vapour may be made to come in contact with it. In certain of the public and private bathing establishments an appropriate apparatus is provided for taking a steam bath at any temperature.

Sometimes the vapour is medicated by impregnating it with aromatic oils from plants boiled in the water, or from some volatile oil being added to it in the vessel; but although these may somewhat augment the excitant action of the vapour, there is no great reason to believe that much remedial agency has been exerted by them. Of other vaporous agents that may be added, mention is made under those agents.

C. WARM WATER BATH.

The *tepid bath*,—the temperature of which may be ranged between 75° and 90° of Fahrenheit, may rather be regarded as a refrigerant than as a diaphoretic, and, therefore, its therapeutical effects fall more properly under Refrigerants, and are considered elsewhere. The ordinary temperature of the warm bath is between 90° or 92° and 96° or 98°. Even when as low as 90°, and lower, a pleasurable feeling of warmth is experienced on immersion, because the temperature of the air is generally below this point, and, accordingly, the body is commonly parting with more caloric.

Although when first applied, the effect may be to gently excite the secretory organs of the skin, the great influence is the equalization exerted by it, owing to the blood being solicited every where to the surface. Under this agency, inflammatory concentrations are broken in upon, and hence it becomes one of the most beneficial remedies in minor degrees of internal hyperæmia especially, and, likewise, in cases where the inflammatory mischief is to a greater amount. Its main action is, indeed, sedative,—that is, the gentle excitation first produced by it on the cutaneous system is so speedily followed by sedation, that the latter effect is markedly predominant. Accordingly, although, on immersion, the pulse may become more frequent, and the respiration somewhat accelerated, languor and evidences of diminished action soon succeed; with impairment of muscular power, a tendency to faintness, and somnolency. Hence, it is used by the surgeon to relax constricted parts, as in cases of luxations, hernia, and of the passage of urinary or biliary concretions.

In almost all acute phlegmasiæ, after more powerful sedatives have been employed, the warm bath is found of decided service, on the principle just mentioned; hence, in thoracic and abdominal inflammations, more especially when occurring in children, it is much used, and there is no remedy more soothing. In eruptive fevers, especially where the eruption does not appear kindly, its beneficial agency is often marked, and it is especially applicable to cases where the temperature of the surface is depressed, and the circulatory action feeble. In such cases, it ought to approach the hot bath in temperature, and many cases absolutely require the strong excitant influence of water heated above the temperature of the body. In chronic inflammations, the properly directed use of the warm bath is not less serviceable. In dyspepsia, too, it exerts a salutary effect, especially when conjoined with friction of the surface; and in various spasmodic diseases,—as convulsions, particularly of children,—its soothing and equalizing influence is admitted by all. There is, however, so much inconvenience in its employment in the last case, when an infant is suddenly taken with convulsions, that, by some, friction has been substituted. (*Dewees.*)

Like the warm vapour bath, it may be beneficial in various dry cutaneous diseases, and in rheumatic affections; and there are cases of amenorrhœa and of dysmenorrhœa,—in the latter especially, when accompanied by a membranous secretion, the result of an excited action of the secretory vessels of the lining membrane of the uterus—in which it is of decided service.

PARTIAL WARM BATHS are much employed, where the desire is, to affect particular portions of the cutaneous surface, and through them, the whole system, or organs in the vicinity of those to which they are applied. Thus, the warm HIPBATH is employed particularly in inflammatory and other affections of the abdominal and pelvic viscera: the warm FOOTBATH, in colds, and with the view of restoring the menstrual secretion when arrested. The influence of the warmth is soon extended to other parts of the capillary system, and diaphoresis frequently results—especially if it be favoured by the warmth of bed, and the use of warm diluent drinks. When the object is, to exert a revellent influence in these cases, the temperature of the water is elevated, and salt and mustard are, at times, mixed with it. The ARM-BATH and HAND-BATH are rarely used except as mere topical agents.

In the use of the warm bath, there is rarely any SHOCK experienced;—in other words, no powerful impression is made by it on the nervous system: hence no apprehension need be entertained of its producing injurious consequences except in highly impressible persons. In such, or where there is a tendency to encephalic affections, the temperature must be carefully regulated so that it be not too excitant. Both the general and topical bath are likewise considered to be unadvisable in pregnancy, and whilst the catamenia are flowing; but the effects, in such cases, have doubtless been exaggerated.

The time, during which the individual should remain in the bath, must be determined by the nature of the case. In acute diseases, a few minutes may be sufficient, but where it is desirable to relax either the skin, as in cutaneous diseases, or the powers of the system, the patient may continue in it for a considerable time. Where the affection is chronic, the bath may be taken two or three hours after a meal, so that digestion may not be interfered with. When the patient leaves the bath, friction with warm flannels may be used in chronic cases. In acute cases, he may be removed from it, and be placed in blankets.

Warm fomentations and **poultices** act as topical baths, by virtue of their warmth and moisture. They relax the parts with which they come in contact, and, as in the case of pediluvia, the soothing influence they exert on the parts with which they come in contact is extended elsewhere, so that a sedative influence may be exerted on the system generally, and especially on the vessels that may be affected with any internal hyperæmia.

Injections of warm water thrown into the rectum or vagina, in cases of diseases of the uterus, peritoneum, or of the upper portions of the intestines, act in the same manner as warm fomentations.

d. FRICTION.

Friction of the body, with dry flannels or with the flesh-brush, excites the action of the secretory organs of the cutaneous surface, and, in moderation, tends to the production of diaphoresis. It is rarely, however, employed with this view, except as an adjunct to the warm bath; and even then is more used hygienically than therapeutically. (See the author's *Elements of Hygiène*, p. 421.) Friction is frequently used topically to modify nutrition, but its consideration in that light will fall under the head of Eutrophics.

SECTION IV.

AGENTS THAT AFFECT PROMINENTLY THE NERVOUS SYSTEM.

I. NARCOTICS.

SYNON. *Obstupefacientia, stupefacientia.*

DEFINITION OF NARCOTICS—MAY BE USED AS EXCITANTS, AND AS SEDATIVES—THEIR ACTION ELUCIDATED BY THAT OF OPIUM—MAY ACT LOCALLY AS WELL AS GENERALLY—MENTAL NARCOTICS—THERAPEUTICAL APPLICATION OF NARCOTICS—IN FEBRILE DISEASES—IN THE PHLEGMASIÆ, &c.—SPECIAL NARCOTICS.

NARCOTICS greatly resemble, in their action—when administered in appropriate doses—the class of sedatives. They differ from them, however, in several respects. Whilst the action of sedatives is not preceded by any degree of excitation, that of narcotics always is. In minute doses, again, narcotics may produce none of the effects that characterize them when given in large doses. Their agency may be altogether excitant; and, with the view of obtaining the modification in the organic actions, which such agency is capable of exerting, they are occasionally exhibited in small quantity.

When given to the extent of inducing their peculiar action, they may be defined—"agents, which first excite and then diminish nervous action, and, in appropriate doses, stupefy." The power of stupefying must, indeed, be esteemed one of their main characteristics.

Although the above definition may apply generally to their operation, when they are administered in a dose proper to produce a narcotic influence, it is obvious, from what has been said, that it is not wholly applicable, when they are given as mere excitants; in such case, they may not "diminish nervous action, and stupefy." They can then, however, be regarded as excitants only; but, in adequate doses, the latter part of the definition is strikingly appropriate; and the effects mentioned must be regarded as the most essential consequents on their employment. Even when they are administered in a full dose, some degree of excitation is first perceptible; the functions of circulation, innervation, and secretion become more or less modified; the pulse beats more rapidly, and forcibly; the skin is hotter and drier than natural; the nervous system exhibits greater impressibility; and the mouth and fauces are dry, or their ordinary secretions are more tenacious than natural; but these evidences of excitement soon pass off—more rapidly in proportion to the size of the dose, —and a train of phenomena, indicating sedation, follows those of excitement; the respiration becomes slower; the skin moist; the pulse reduced to the natural standard, or even below it; the impressibility of the nervous system is obtunded; the tongue becomes moist; and all the symptoms exhibit that a sedative and soothing agency has been exerted. Perhaps, in every case, however large the dose of the narcotic may be, some degree of excitement might be perceived as a precursor of the sedation, were due attention paid; but the sedative effect of a very large quantity of any of the narcotics supervenes so rapidly on the stimulant, that the attention of the practitioner is scarcely directed to the latter operation—especially as it is not the one for the production of which he has prescribed it.

The marked difference between a stimulant and a sedative dose of the same agent, can be understood from the cases, so often related in the newspapers, of persons, who, for wagers, have swallowed, at once, a large draught of some alcoholic liquor. The sedative effects of this powerful excitant—excitant, that is, in a smaller dose—are so speedily exerted, that a stop may be put to all the functions, without there being any marked symptoms of previous hurry in the organic actions.

When a narcotic is taken, the first effects occur in the nerves distributed to the lining membrane of the stomach. These are rendered less impressible, and the obtunding influence is soon extended to the great nervous centres, which are affected like the nerves with which the narcotic first comes in contact. In this manner, the function of innervation generally has its activity diminished; and, therefore—directly as well as indirectly—the gastric functions may be impaired. If the narcotic be taken before eating, and when a marked desire for food is present, the appetite may be diminished or extinguished, under the new condition of innervation. If food have been received into the stomach, chymification may, for like reasons, be retarded; and the whole of the digestive operations—chymification, chylification and defecation—may exhibit an obvious degree of torpor. It can thus be comprehended, that the use of a narcotic may be followed by constipation, and that it may be well adapted for diarrhœa, where an indirect astringent agency appears to be indicated. The precise *modus operandi* of the narcotic may, in these cases, vary with the dose: where it is large, the whole function of innervation may be blunted; and not only the secretions, but the peristole of the intestines be diminished; whilst if the dose be smaller, the effect may be mainly exerted upon the nerves distributed to the gastric apparatus, without the rest of the nervous system materially participating. In cases of diarrhœa, opium, like every therapeutical agent, has a relative action; and the same may be said of its employment in other morbid conditions. If irritation or inflammation exist in any portion of the alimentary canal, such irritation or inflammation may be allayed by a sedative dose of a narcotic; and, in this way, the pathological condition being removed, its symptom—the increased number and morbid character of the evacuations—may cease likewise.

It has been a very common remark, that opium is not well adapted for cases of pneumonia, bronchitis, &c., because it "diminishes the secretions," but this appears to be a faulty method of explaining its action. The suppression of secretions is not a pathological condition. It is only the symptom of such a condition, and when we state, that the indication is *to restore the secretions*, if the expression have any meaning at all, it can only convey the idea, that the pathological condition, which occasions their suppression, must be removed. Now, we know, that the first consequence of the inflammation of a mucous membrane is a diminution of its wonted secretion; and that, after the inflammation has persisted for a time, an increase of the secretion takes place, but it is no longer of a healthy character. It is a secretion, accomplished by vessels labouring under inflammatory excitement. Two opposite effects, then, on the secretory function, are produced by different stages of inflammation. Yet, the indication, in both cases, must obviously be alike. It must be, to remove the pathological condition, of which these effects are symptomatic. A narcotic we know to be, in appropriate doses, a sedative;—that is, it is capable of diminishing the force of the circulation, and the energy of innervation. It is, therefore, well adapted for acting as a contrastimulant—for allaying inflammatory excitement. A knowledge of its properties would suggest to us the propriety of its employment in the diseased state of mucous membrane, instanced above; and experience ought to show—as it does daily show—that in one of the conditions assumed,—that is, in the early period of mucous inflammation—it will restore the secretions; and, in the other, where the mucous secretions have become profuse, and morbid, it will diminish them, —by diminishing the inflammation that occasioned them. It is obviously, therefore, incorrect to lay down the broad law, that *opium diminishes the secretions*, and that its use is improper whenever the indication is *to restore the secretions*. Such an indication ought never to be imagined. It is unmeaning, and can only have been suggested in the ignorance of true pathology; and the author is happy to find, that a recent writer on therapeutics (*Spillan*) expresses his entire accordance with these sentiments, as contained in the first edition of this work. In cases of pneumonia, where the expectoration has been free, a diminution of the sputa has seemed to supervene on the administration of narcotics; but this has been owing to the agent not having been administered in a dose adapted to the pathological condition of the pulmonary organs. Where the opium is given in a small dose—as is too often the case—it will as surely add to the inflammation, as the same amount of any other excitant; and if we add to the inflammation, we may arrest the secretion altogether, by bringing back that condition of the tissue, which existed at the onset of the inflammation; but if, in this very case, a full sedative dose were administered, none of the evils might be found to follow. The sedative would allay the excited organic actions, and if the secretion were diminished—as it probably would be—it would be a fortunate diminution, because arising from lessened inflammatory excitement in the lining membrane of the bronchial tubes, or in the tissues in their vicinity.

Another example may be taken, where the secretions and excretions are manifestly facilitated by narcotics. It has been already remarked, that opium is administered in cases where there is an undue number of alvine evacuations, with the view of exerting a constipating effect. But it is no less administered where constipation is dependent upon certain pathological conditions. When enteritis or inflammation of the peritoneal coat of the intestines exists, constipation is a common symptom; and, on the other hand, if the inflammation be seated in the mucous coat, diarrhœa is as common. Why this difference should exist is owing to the inflammatory condition of the follicles, and of the mucous membrane generally, being accompanied, after the disease has continued for a short time, by augmented secretion. It might seem, however, that, as the peritoneal coat so closely invests the muscular, the latter ought to be thrown into inordinate contraction, and an increase be occasioned in the number of the evacuations from this cause. Such contraction does exist, but the necessary irritation in the lining membrane is wanting to induce diarrhœa; the contraction of the fibres has more of the character of spasm; and a derivative effect is perhaps exerted, owing to the concentration of the excited organic actions in the peritoneal coat diminishing the amount of secretion from the mucous coat; in this manner, constipation comes to be one of the phenomena of peritoneal enteritis. In such a case, opium, judiciously administered, exerts its sedative agency; diminishes the inflammatory action in the peritoneal coat, and resolves the spasm in the muscular coat; so that the causes of the constipation being obviated, it ceases, and we thus have a laxative, or cathartic effect, induced by remedies, which, in other pathological conditions, are well adapted for producing opposite results. These are cases, which exhibit the value of the possession of sound pathological and therapeutical knowledge. We discover empirically the property of our drug, and, having accurately appreciated the agency it is capable of exerting, we can say *à priori* what will be the pathological condition, in which the greatest benefit may be reaped from its employment. Accordingly, as the author has remarked in an early part of this volume, analogy has led to the employment of the invaluable agent—opium—in cases, in which some years ago it would never have been ventured upon. Some pathologists have considered it best adapted for phlegmasiæ of the peritoneum—both of the membrane proper, and its extensions over the different viscera. Such was the view of the indefatigable investigator of the diseased conditions of the animal economy—Armstrong. In these phlegmasiæ, he conceived it to be *perhaps* the most efficient therapeutical agent that we possess; and, although he esteemed it best to unite it with blood-letting, and to repeat both remedies according to the urgency of the case, he was disposed to think, that if he himself were labouring under peritoneal enteritis, and were told, that he must rest his hopes upon the lancet singly, or upon opium singly, he should be disposed to select the latter.

What Armstrong said of the use of opium in these cases has been extended to similar pathological conditions in other serous tissues, and elsewhere, and many advantages have accrued from its employment, in some form of preparation, in cases in which, at one time, its use was unknown, or considered inappropriate.

In a modern work on Therapeutics we have the following remark.—"Concerning the operation of opium, medical sentiment continues to be divided, though the preponderance is decidedly in favour of its stimulant properties, and with such an impression it is employed." (*Professor Chapman*, of Philadelphia.) It is this belief, as well as the want of knowledge of the essential difference in the action of narcotics, according to the dose, that has occasioned opium to be discarded, in cases of undue vascular and nervous excitement, for the removal of which it is so admirably adapted. Impressed with an unfavourable sentiment towards its use—a sentiment derived from authors, and teachers—the young practitioner is apt to administer it in phlegmasial affections, either in doses so small, that no sedative effect is induced, or, in his caution, he strikes the medium ground between stimulation and sedation: in the former case, he witnesses, perhaps, an aggravation of the excitement, and, in the latter, either no effect whatever, or one of aggravation; and he, therefore, too hastily concludes, that the use of opium is, in such cases, inappropriate and injudicious. Under these feelings, he never employs it afterwards, and yet he conceives himself entitled to say, from *experience*, that opium is, in no case, advisable, where inflammation is present.

Such were the views strenuously inculcated when the author commenced the study of medicine; and many a practitioner of the present day, who may entertain them, will find, that his impressions have been derived from others. A little experience sufficed, in the author's case, to induce him to throw off the trammels of authority, and the judicious remarks of Armstrong confirmed him in his course. Both in public and in private practice, he has administered it largely; and, from the results, is prepared to say, that we have not in phlegmasiæ in general a more valuable agent, if we except the lancet; and there are obscure cases of inflammatory action—in puerperal females especially—where it can be advantageously employed when the lancet cannot. It has, indeed, been argued, that where such affections have been relieved by opium, the very fact shows, that they were not inflammatory, and farther, that we may often mistake neuralgic diseases for inflammatory, as is sufficiently shown by the circumstance, that narcotics completely remove affections, which were previously supposed to be inflammatory. The result in no respect invalidates the diagnosis. Opium is a precious sedative, and it is, therefore, as well adapted for the one class of cases as for the other.

A very slight reflection, on the mode in which opium relieves pain, will place this subject in a striking light. It will show how a narcotic may prevent the aggravation of diseased action. If we apply opium to a part of the dermoid surface, whose organic actions are morbidly modified, the effect of the narcotic is exerted on the nervous ramifications themselves; their impressibility is diminished; and the irritation, under which they have been labouring, may be no longer appreciated by the brain. In the same manner, if the narcotic be swallowed, its effects are exerted upon the nerves of the stomach, and, through them, on every part of the nervous system. The brain no longer appreciates the irritation, or does so in a diminished degree. The irradiations, which would otherwise have been reflected to every part of the economy consequently cease, and, by the simple arrest of morbid sympathies, the amount of disorder is diminished. In like manner, the induction of sleep by a full dose of opium will, at times, allay tumultuous action of the nervous and vascular systems, which could not have persisted without adding to the amount of mischief.

In the disease of colica pictonum we have a state of the alimentary tube, in which the agency of opium may be usefully employed, with the view of removing constipation. This is often dependent upon irregular action of the nerves distributed to the muscular fibres of the intestines,—a state, which a combination of opium with some cathartic—as with the mild chloride of mercury—is well calculated to remove. The opium allays the inordinate action of the nerves,—resolves the spasm,—

and permits the mild chloride to exert its ordinary cathartic action. For reasons like these, strengthened by the results of experience, a combination of calomel with opium, or with sulphate, acetate, or muriate of morphia, is a common prescription, with many practitioners, in enteric inflammation. In most of the London hospitals, it may be regarded as an officinal formula.

It has been an interesting topic of inquiry,—how narcotics exert their constitutional effects:—that is, whether by the impression they make on the nerves of the part with which they come in contact—such impression being conveyed to the rest of the nervous system—or, whether they must not, in every case, enter the blood-vessels, affect the nerves distributed to the inner coat of the vessels, or pass with the current of the circulation to the great nervous centres. There are many facts, which may be adduced in favour of each of these views. As regards the first, one of the strongest arguments is, the rapidity with which the effects of certain narcotics are induced. Of these, perhaps the most marked is an agent, which the author has classed amongst the sedatives, but which has been placed, by many toxicologists, amongst the narcotics—the hydrocyanic acid. The effects of this acid have been examined by numerous observers. Magendie asserts, that if a single drop be put into the throat of a dog, the animal makes two or three deep, hurried respirations, and instantly drops down dead; that it causes death almost as instantaneously when dropped under the eyelid; and that when it is injected into the jugular vein, the animal falls dead at the very instant, as if struck with a cannon-ball or with lightning. "In repeating these experiments," says a recent writer, (*Christison*,) "in order to determine, figuratively, the shortest period, which elapses before the poison begins to operate, as well as the shortest time in which it proves fatal, I found that a single drop weighing scarcely a third of a grain, dropped into the mouth of a rabbit, killed it in 83 seconds, and began to act in 63 seconds,—that three drops, weighing four-fifths of a grain, in like manner killed a strong cat in thirty seconds, and began to act in ten,—that another was affected by the same dose in five, and died in forty seconds,—that four drops weighing a grain and a fifth did not affect a rabbit for twenty seconds, but killed it in ten seconds more,—and that twenty-five grains, corresponding with an ounce and a half of medicinal acid, began to act on a rabbit as soon as it was poured into its mouth, and killed it outright in ten seconds at farthest. Three drops, projected into the eye, acted on a cat in twenty seconds, and killed it in twenty more; and the same quantity, dropped on a fresh wound in the loins, acted in forty-five, and proved fatal in a hundred and five seconds."

Again, the empyreumatic essential oil of tobacco, as well as strychnia, has caused death in two minutes.

Now, in the case of hydrocyanic acid especially, which proves fatal in a large dose, even before the animal can be removed from the lap of the experimenter, it seems difficult to offer any other explanation, than that its effects are exerted upon the nervous radicles with which it is made to come in contact, and that thence, with the rapidity of lightning, the lethiferous influence is propagated to the brain, which dies first, and, in due succession, all the functions, under its presidency, cease to act. Dr. Christison, indeed, when treating of opium, affirms, that "the old doctrine, that the blood-vessels have no concern with its action, and that it acts only by the conveyance along the nerves of a peculiar local torpor arising from its direct application to their sentient extremities, has been long abandoned by most physiologists as untenable. But some have adopted a late modification of this doctrine, by supposing, that opium may act both by being carried with the blood to the brain, and by the transmission of the local torpor along the nerves. They believe, in fact, that opium possesses a double mode of action, through sympathy, as well as through absorption." "It would be fruitless," he adds, "to inquire into the grounds that exist for adopting or rejecting this doctrine, because sufficient facts are still wanting to decide the controversy. So far as they go, however, they appear adverse to the supposition of a conveyance of impressions along the nerves, without the previous entrance of the poison within the blood-vessels."

All the difficulties, in the way of the theory of the sympathetic action of opium, Dr. Christison thinks, are removed, by the doctrine of Messrs. Morgan and Addison. According to this, the experiments, which appear at first sight to prove, that opium operates by being carried with the blood to the part on which it acts, are easily explained by considering, that the opium makes a peculiar impression on the inside of the vessels, which impression subsequently passes along the nerves to the brain. In the case of hydrocyanic acid, however, the imbibition must take place most rapidly, as the deadly results supervene so immediately on its application. Its penetrating power must largely exceed that of other narcotic agents, which require a long time before their effects are perceptible. Its action obviously can only be accounted for, by presuming, that its impression is made on the nerves, either of the part, or of the interior of the blood-vessels: there is not time for the poison to pass to the nervous centres with the circulatory current, and the experiment of Magendie—which showed that death supervened on the very instant when the acid was injected into the blood-vessels, whilst a few seconds elapsed before its fatal action was exerted, when it was put in contact with an absorbing surface—would favour the notion of

Messrs. Morgan and Addison, that the impression is made on the nerves distributed to the inner coat of the blood-vessels, although the difficulty remains, why these nervous filaments should be more impressible to poisons than the nervous radicles, distributed to the external dermoid or other tissues. If, however, the explanation of these gentlemen be the true one, it must persist, whatever may be the difficulty in suggesting a satisfactory explanation of the phenomena.

It is proper to bear in mind, in this investigation, that many agents, of the class now under consideration, do produce impressions on the nerves of the part to which they are applied, without the general system being materially implicated;—a circumstance, which would favour the views of those, who consider it indispensable, that poisons should enter the blood-vessels, in order that they may act on the general system. Robiquet remarked, that when the vapour of concentrated hydrocyanic acid was confined for some time in a glass tube, with a finger on each open end, the point of the finger became benumbed, and remained so for more than a day. Dr. Wilson Philip found, that when opium was applied to the mucous coat of the intestines of a living rabbit, the muscular contractions of the gut were immediately paralyzed, without the general system being affected for some time. The same effect was observed by Messrs. Morgan and Addison to follow the application of ticunas to the intestine. An instantaneous and total suspension of the peristole took place whenever the poison touched the gut. Dr. Monro, Secundus, found, when an infusion of opium was inserted between the skin and muscles of the leg of a frog, that the leg soon became paralyzed, while the animal was able to leap about briskly on the other three.

Many similar examples of purely local impression might be mentioned, were it necessary. The singularity is, that the general system should, in these cases, remain intact. A striking instance of purely local action, and, at the same time, of that inexplicable preference, of which we have so many examples, in the influence exerted by various agents on the economy, is the effect of some of the class of narcotics in dilating the pupil. This is done by the extracts of belladonna and stramonium, without the general nervous system being in the least implicated; whilst the most energetic of the narcotics—opium—exhibits no such preference of action on these nerves.

There can be no doubt, then, that narcotics may affect the frame through the medium of the nerves, without its being necessary, that they should proceed, with the blood, to the great centres of the nervous system; but there are strong facts to show, that, in certain cases, they are absorbed, and act through the medium of the circulation. Still, as has been suggested, (*A. T. Thomson,*) such absorption would seem to be by no means essential. The strongest arguments in favour of it—as properly stated by Dr. Thomson—are: *First.* The time that supervenes between taking a dose of opium and the manifestation of its influence on the system—a time sufficient, certainly, for the absorption of the narcotic; but, in reply to this argument, he states, that the intimate combination of the meconate of morphia, with the other constituents of the drug, requires some time before it can be so far separated as to be able to act with energy on the sentient extremities of the nerves of the stomach: for "we find," he adds, "that the time, which supervenes, is in the direct ratio of the state of solution and separation from the other constituents of the opium, in which the meconate exists in the preparation employed." But this explanation is unsatisfactory. When taken in a soft pill, opium produces its effects almost as soon as when any of its forms of preparation are administered. It has, indeed, been maintained, that this is not the fact, but the very cases adduced are such as establish the affirmative of the position. In a case, related by M. Desruelles, the sopor was fairly formed in fifteen minutes, after two drachms of solid opium had been taken. *Secondly.* The increase of the symptoms, for ten or twelve hours after their inception, although the opium is as much in contact with the nerves in the first quarter of an hour, as at the end of the twelve hours. This argument, Dr. Thomson observes, is more difficult to answer than the first, and, his opinion is, that it certainly indicates absorption. This is probable; but, under any view, it is somewhat strange, that the augmentation should continue so long; and the supporters of the doctrine, which holds, that the effect must take place through the medium of the nerves, might suggest, with much speciousness, that such effect is as easily explicable, on the idea of the repetition of narcotic impressions, made by fresh and fresh portions of the narcotic coming in contact with the nerves distributed to the inner coat of the blood-vessels, as by the view, that the narcotic must pass, with the blood, to the nervous centres themselves. *Thirdly.* The rapid effects, which follow the injection of opium, in solution, into the veins; and not opium only, but any of the narcotics. Orfila found, that an ounce of the extract of the leaves of conium maculatum killed a dog in forty-five minutes. Ninety grains, inserted into a wound, killed another dog in an hour and a half: and twenty-eight grains, injected into a vein, killed another in two minutes. It is, therefore, legitimately inferred, that these substances act by entering the blood-vessels: but even granting this, it does not follow—as the author has endeavoured to show—that the substance must pass with the blood to the great nervous centres. It may act on the nerves of the inner coat of the veins. Indeed, the short time that elapses, prior to the supervention of the narcotic effects, when the poison is injected into the blood-vessels, is somewhat unfavourable to the doctrine of the necessity of direct contact with the great centres of the nervous system.

But there are facts which show incontrovertibly, that opium may enter into the fluid of the circulation. During the confinement of the lady of a friend of the author, it was considered necessary to administer morphia to her; when the infant became so completely narcotized, that serious apprehensions were entertained for its safety. It ultimately recovered. A similar case is given by Barbier. The infant was manifestly affected through the milk of the mother, who had taken a large dose of the wine of opium. In these instances, the narcotic must have passed into the circulation of the mother, and been separated by the mammæ. We are compelled, therefore, to admit, that opium may commingle with the blood in the vessels, and even if it be not admitted, that it proceeds to the great nervous centres,—there to exert its appropriate influence,—it may be conceived, that by coming in contact with the nerves distributed to the coats of their blood-vessels, it may produce a more powerful effect upon the nervous system, than if its action were wholly exerted on the inner coat of the vessel, into which it first passes.

With these facts, it is impossible to arrive at any single exclusive deduction. It would seem, that narcotics may exert their effects upon the nerves of a part of the dermoid surface, and on those distributed to the inner coats of the blood-vessels; and that they may pass into the current of the circulation, and proceed, with it, to exert what precise agency is not so clear.

Dr. A. T. Thomson has affirmed, that the nerves, more particularly affected by narcotics and sedatives, are the respiratory;—but it is not easy to see how he attains this conclusion. He quotes, in confirmation of the opinion, a series of experiments, conducted by Sir Benjamin Brodie, who introduced, in one instance, a drop of volatile oil of bitter almonds into a wound in a rabbit: after five minutes, respiration had ceased; but the heart "was still beating through the ribs;" and, by renewing and keeping up respiration, by artificial means, for sixteen minutes, spontaneous breathing was re-established; all the functions of the brain revived, and life was in fact restored. Dr. Thomson adds—"It is not easy to explain, why one set of nerves should be more particulary influenced than another by narcotics." This case does not, however, appear to be in point. There is a marked difference between the voluntary, the excito-motory, and the organic nervous systems. The voluntary muscles are under the presidency of the first:—the involuntary, under that of the second, and probably of the third: the respiratory organs are supplied by encephalic nerves, as well as by the true spinal or excito-motory, and by ganglionic nerves: but the heart is singularly situate as regards its nerves. Although capable of being affected through them, its action may continue after the great nervous centres have been destroyed—provided it receives its ordinary stimulus, by the maintenance of artificial respiration. (See the author's *Human Physiology*, 4th edit. ii. 169. Philad. 1841.) When, however, the cerebro-spinal axis is destroyed, the mechanical phenomena of respiration necessarily cease.

In like manner, if the functions of the brain be suspended, by the action of a powerful narcotic, the respiratory phenomena, which are dependent upon the influence of the brain, are suspended also; and if the action of the narcotic be fleeting, we may conceive, that, by keeping up the mechanical phenomena of respiration, and thus maintaining the heart in action, as the influence of the narcotic passes away, the encephalon may resume its wonted functions, and respiration be completely re-established, of which an interesting case has been recently narrated. (*Caspar Morris*, of Philadelphia.) The experiments of Sir Benjamin Brodie ought, therefore, to be borne in mind; and although, in the case of narcotics, whose action is prolonged, no useful hint may be derived from them of a therapeutical nature, yet, as has been said before, where a narcotic has been taken, whose action is transitory, the recollection of them, and a due acquaintance with the physiological inferences deducible from them, *may* lead to the preservation of a life, which, otherwise, might have been lost.

Narcotics, then, may be used as excitants, or as sedatives. Generally, they are employed to diminish impressibility, and to allay excitement; and a knowledge of their medicinal properties enables us to administer them even when high inflammatory action may be present. The case of severe headache supervening on great loss of blood from the uterus was before selected with the view of pointing out the difference that may exist between hyperæmiæ of various kinds. It was then remarked, that, a few hours after blood has been lost to an inordinate extent, by this, as well as by other hemorrhages, the nervous impressibility may be irregularly developed, and, under the erethism of the nerves distributed to particular blood-vessels, these vessels assume augmented action, and evidences present themselves in the circulatory movement, which appear to indicate the existence of vascular force and repletion; and that, in all such pathological conditions, the indication cannot be, to draw more blood from a system already exhausted, as far as is compatible with the persistence of life. On the contrary, it must clearly consist in allaying that irritability of the nervous system, which has been so inordinately developed; and the best mode to accomplish this is to administer a full sedative dose of opium, under the action of which the nervous and vascular turmoil rapidly subsides into a state of quietude.

It is astonishing to what an extent narcotics may be borne with impunity, where a habit of resistance has been acquired by long protracted indulgence. Dr. Russel, in his *History of Aleppo*, states, that a Turk of the name of Mustapha Shatar—an opium eater in Smyrna—took, daily, three drachms or 180 grains of opium; and in the *Confessions of an English Opium Eater*, the author of that work is affirmed to have consumed, at one time, eight thousand drops of laudanum, daily. If we consider, that 25 drops of laudanum are equal to one grain of opium, this would make 320 grains, or upwards of five drachms, in the day. In a case of cancer of the uterus, treated by Drs. Monges and La Roche of Philadelphia, the quantity of laudanum was gradually increased to three pints in the 24 hours, besides a considerable quantity of solid opium. (*Professor Chapman*, of Philadelphia.)

Besides the physical agents, classed under the head of narcotics, there are certain moral influences, which may be placed in the same division. These have been termed MENTAL NARCOTICS and it has been properly remarked, that "persons, who are endowed with great nervous sensibility, are for the most part powerfully affected by mental pleasures and pains; and, therefore, when the higher orders of society and men of intellectual acquirements are affected by mental diseases, it is sometimes necessary to employ mental narcotics, when material substances fail in procuring repose." (*A. T. Thomson.*) Perhaps, however, in all cases, such mental operations are wholly of a revellent kind; and sleep ensues by the mind being diverted from trains of thought, or impressions, which prevented it. Impressions, made upon the nerves of audition, have a soothing effect, more than those on any of the other senses. It is thus, that music exerts so powerful an effect on the frame,—partly, perhaps, by the mere excitation of the auditory nerves, and partly, also, by the abstraction, which it induces, when selected so as to suit the precise feeling. Its effect upon the hearer has been beautifully depicted by Dryden, in his *Alexander's Feast;* and, that the picture is not overdrawn, must be admitted by all, who have heard the piece well read, with the 'action suited to the word,' and, indeed, on simple perusal, by every one, whose mind is attuned to the livelier sympathies.

If the musical air be lively, and varied, the attention may be kept on the alert, so that sleep may be dispelled; but if its character be 'most musical, most melancholy,' and, withal, more or less monotonous, sleep is almost sure to ensue. Armstrong—himself one of the profession—has well described the effects of music when he says:

> "Music exalts each joy, allays each grief,
> Expels diseases, softens every pain."

But, it is not necessary, that the intellectual pleasure of music should be always experienced, when the object is to restore sleep to the sufferer, or to one who is in health. Any succession of unvaried sounds can induce it;—as the bubbling of a brook; the purling of a rill; the hum of a distant, busy multitude; a discourse —however interesting—delivered in a drawling monotonous manner; the clacking of a mill, &c. In like manner, the ballad of the nurse, with the rocking of the cradle, soothes the restless infant; with the same view, the nurse scratches its back; and the older individual is often recommended to count, over and over again, as far as fifty, and the expedient often succeeds. The mind is abstracted from the thoughts and reflections that occupy it, and the monotony of the occupation combines to accomplish the desired result. The passes and other manipulations of the animal magnetizer induce a like effect, along with a series of singular and anomalous phenomena, the consideration of which would be inappropriate here.

It can readily be conceived, that, in many cases of insanity, appropriate music may exert a valuable therapeutical agency, but it requires the greatest caution on the part of the practitioner, to adapt it to particular cases. Lively music may abstract the melancholic from his corroding dejection; and the more soothing has been known to produce the happiest effects on the furious maniac. To adapt it properly, it is important to know something of the history of the patient, lest associations of a painful character should be called up, which might vibrate to every part of the frame, and give rise to an increase of the aberration.

Therapeutical Application of Narcotics.

The inquiry, already entered into, respecting the properties of narcotics as medicinal agents, has rendered it unnecessary to say much concerning their therapeutical application. Allaying pain, producing sleep, and diminishing action, in large doses, it is only in such doses that their use can be proper, where there is augmented vital activity. On the other hand, as they are excitant in small doses, they must be exhibited in such doses, where the object of the physician is to add to the amount of excitation.

In intermittents.—In intermittent fevers, they are occasionally administered to stop an anticipated paroxysm: the effect is probably induced by the new action they occasion on the nervous system, which breaks in upon the morbid catenation that exists in these periodical affections.

In continued and remittent fevers.—In continued, and remittent fevers, when narcotics are considered to be indicated by extreme watchfulness and restlessness at an early period of those diseases, they should obviously be given in such quantities, that their sedative influence may be fully exerted; otherwise, the exaltation of the vital manifestations may be augmented by them. The author well recollects, at the period when he followed the clinical lectures of the late Dr. Home, at the Royal Infirmary of Edinburgh, but little hesitation existed as regarded the administration of opium, after the ninth day of a continued fever; not because the intelligent Professor conceived, that there was philosophy in the observance of days, but because it had appeared to him that prior to this period—that is, during the first week of the disease—the beneficial effects of the opiate were not as marked as they were afterwards. The ordinary dose, directed by Dr. Home, was thirty-five drops of the *tinctura opii.* Pursuing the plan, inculcated by him, the author was in the habit—early in practice—of waiting until about the commencement of the second week, and then of prescribing this quantity, but, as he became better acquainted, from experience, with the properties of the drug, and with the pathological conditions present in fever, he did not hesitate—in public and in private practice—to give it in larger doses, and even at an early period of the disease; and he is not prepared to say, that he has, in a solitary instance, observed unpleasant results from its administration. He generally begins with 40 or 50 drops, in the case of the adult, or with 15 or 20 drops of the black drop, or with one of the preparations of morphia, and is careless as to the precise period of the complaint, provided symptoms exist, which appear to him to indicate its use.

In inflammation, spasmodic diseases, &c.—Of the employment of narcotics in the different phlegmasiæ, the author has already treated at so much length, that it is not necessary to add anything farther here.

In the spasmi of Cullen, and in some of the vesaniæ, they are, at times, the only agents that afford the slightest relief, and it is astonishing what quantities may be taken without the supervention of narcosis. In all such cases, they act as indirect agents belonging to the class of "antispasmodics." In delirium tremens, opiates are trusted to solely by some, but they are rarely, if ever, indispensable,—the disease generally yielding to an expectant mode of management. (See the author's *Practice of Medicine,* ii. 349, Philad. 1842.) It would be endless, however, to attempt to point out every pathological state, in which the use of narcotics may be indicated. The practitioner must judge for himself, and if he understands the nature of the morbid phenomena, and is well acquainted with the medicinal properties of his narcotic, he cannot fail to know, where its employment would be salutary or noxious. The object of this work is to attempt to lay down great general principles of therapeutics, and to avoid detail. Of the evils of too great detail, we have, indeed, the most marked examples in some of the existing works on Therapeutics and Materia Medica, from the perusal of which it is impossible for the student to rise with other feelings than those of confusion.

SPECIAL NARCOTICS.

1. O'PIUM.

Opium is the concrete juice of the unripe capsules of *Papa'ver somnif'erum*. The process for procuring it is much the same in all countries. It consists in making incisions into the capsules, and collecting the juice that exudes. Its name—from οπος, 'juice,' sufficiently indicates its nature. The poppy is cultivated in various countries, but especially in Asia Minor, Hindusthan, and Egypt, and opium is collected, although not to much extent, in Europe. In fact, the price at which Turkey opium can be imported renders it an unprofitable speculation.

The principal varieties of opium, met with in commerce, are the *Turkey*, the *Egyptian*, the *East Indian*, the *Persian*, and the *European*.

1. TURKEY OR LEVANT OPIUM is raised in Anatolia, and is exported from Smyrna to the extent of about 400,000 lbs.; hence it has been called, also, *Smyrna opium*. It is produced at several places, from ten to thirty days' distance in the interior; but that grown at Caisar, about 600 miles from Smyrna, is said to be most esteemed. It comes to the United States either directly from the Levant, or indirectly through some of the ports of the Mediterranean. This variety of opium is said to be beyond comparison, the most abundant in our market, and it is that from which the ordinary descriptions of opium are drawn. (*Wood & Bache.*) It occurs in irregularly rounded or flattened masses, varying in size, but rarely exceeding two pounds in weight, usually surrounded with the reddish capsules and leaves of some species of rumex. When first imported, it is soft, and of a reddish-brown colour; but becomes hard and blackish by keeping. Dr. Wood states, that the colour of the finer parcels of Smyrna opium is light brown; of the inferior darker. When cut into, it has a waxy lustre; and when torn minute shining tears are observable, seeming to show, that the masses are made up of agglutinated

tears. Although this variety would appear to be the purest met with, it is frequently largely adulterated. Dr. Pereira states, that from one sample, weighing ten ounces, he obtained ten drachms of stone and gravel. The average quantity of morphia, that can be obtained from it, has been estimated at about 8 per cent. (*Pereira.*) Dr. Wood affirms that good Smyrna opium ought to yield 10 or 11 per cent.

A variety is imported from Turkey, which has been termed CONSTANTINOPLE OPIUM. Of this there would seem to be two sorts. The one in very large irregular cakes, which is of very good quality, and the other in small flattened regular cakes, from two to two and a half inches in diameter, and covered with the poppy leaf. It has a more feeble odour than the other, and blackens in the air. The cakes are never covered with the rumex like the Smyrna opium. Constantinople opium is much inferior to Smyrna opium, but superior to the Egyptian. Guibourt states, that it does not yield more than half the quantity of morphia obtainable from Smyrna opium; yet there is great discrepancy in the statements on this head, sufficient to lead to the belief, that different kinds of opium are taken to Constantinople and exported from thence, so as to be called Constantinople opium.

2. EGYPTIAN OPIUM is only of recent introduction into commerce, and is understood to be one of the products of the agricultural speculations of the present Pacha of Egypt. (*Christison.*) It is imported in round flat cakes, weighing from four to eight ounces, and wrapped up in some leaf. It is hard and dry; of a pale-brown colour, and waxy lustre. According to Guibourt, it affords only five-sevenths of the morphia obtainable from Smyrna opium. By another experimenter (*Merck*) from 6 to 7 per cent. was obtained from it, and it yielded much meconic acid. Another specimen, examined by Mr. J. Evans, of Philadelphia, afforded only 3.55 per cent. (*Wood & Bache.*) It is evidently, therefore, inferior to the varieties of opium already considered; yet some of it would appear to be excellent: a specimen taken from a large quantity, that was purchased for Constantinople opium, yielded Dr. Christison rather more chlorohydrate of morphia than average opium from Smyrna. It would appear to have been pretty largely imported into Great Britain for a few years past, and to have been freely purchased at a price from ten to twenty-five per cent. under that of fine Smyrna opium; although, for the the most part, more inferior than in proportion to the difference of price. (*Christison.*)

3. INDIAN OR EAST INDIAN OPIUM. Three varieties of East Indian opium are known in commerce,—the *Malwa,* the *Be-*

nares, and the *Patna*. The last two would, however, appear to be undistinguishable, and, accordingly, they are considered, by most pharmacologists, under the name of *Bengal opium*. (*Pereira, Christison, Wood & Bache.*) Little or none of the East Indian opium reaches the United States; but it is not improbable, that the existing difficulties in China may cause it to be brought hither as well as to Europe.

Bengal opium is met with in balls, each weighing about three pounds and a half, and packed in chests, each containing about forty balls, which are hard, and consist of a case about half an inch thick, and half a pound in weight, formed of tobacco leaves and agglutinated poppy petals, and filled with a black pitch-like mass, soft enough, even when some years old, to be taken out with a spatula. It is the most inferior of the East Indian opiums, certainly not containing more than half the quantity of morphia procurable from good average Turkey opium. (*Pereira.*) The Benares opium is the kind prepared by the Chinese for smoking, and its consumption would appear to be enormous. Prior to the difficulties with China, the sales there alone had rapidly risen to the amount of three millions of pounds avoirdupois, worth about as many pounds sterling. (*Christison.*) A variety of Bengal opium, called Garden Patna Opium, results from an improvement in the mode of preparing it. Dr. Christison states, that he has examined specimens, which were little inferior to average Turkey opium in the quantity of morphia they contained. This variety is not, however, known in commerce.

Malwa opium has usually been regarded as an inferior kind of East Indian opium, but it is said to have lately risen greatly in value, and to be now highly esteemed. Dr. Pereira describes two varieties of it; the one in round flattened cakes or balls, weighing ten ounces; packed in a coarse kind of chest, composed of broken poppy petals; of a dark brown colour; homogeneous texture when cut into, and of an odour similar to that of Smyrna opium:—the other in flattened cakes without any outer covering; dull, opaque, of a blackish brown colour externally, and somewhat darker and soft within; having an odour something like that of Smyna opium, but less powerful, and combined with a slight smoky smell. According to Guibourt, it furnishes not more than one-third of the morphia obtainable from Smyrna opium.

Under East India opium, Dr. Pereira describes two other varieties—the *Cutch opium* and the *Kandeish opium*, but they are of but little interest as they are not found in commerce.

3. Persian Opium, also called *Trebizon Opium*, in consequence of its being imported into Europe from Trebizon on the Black Sea, is in the form of cylindrical sticks, become somewhat angular by pressure; of about six inches in length, and half

an inch—more or less—in diameter; enveloped in a smooth shining paper, and tied with cotton. It is soft and flexible, and does not become hard even when kept for years. It is of a paler brown colour than any other kind; and of a distinctly granular texture. Its taste is intensely bitter; and it is of very inferior quality. Dr. Christison states, that, in 1834, he saw, in the London Docks, many large chests of it, which were quite unsaleable. It has been seen in this country, but not often.

4. **European Opium.** This name is given to opium, which has been made in Great Britain, France, Germany, and Greece. It can never become an article of commerce, in consequence of the low price at which foreign opium can be imported. Some that was raised by Dr. Young of Edinburgh closely resembled, in its characters, the Egyptian or the Malwah opium, excepting that it was in roundish masses. It was hard, dry, pulverizable, of a light brown colour, shining and perfectly homogenous, and brought a better price in the market than fine Turkey opium. From some prepared by Messrs. Cowley and Staines 7.57 per cent. of morphia were obtained. Another specimen of British opium yielded, however, only 4.4 per cent.

The opium made in France is described by Pelletier as of a deep reddish brown colour, and brittle when dry; yielding in some specimens, a considerable per centage of morphia,—according to Pelletier 10.38 per cent. German opium, prepared from the purple poppy, *Papaver somniferum*—var. *nigrum*, yielded likewise a large per centage:—according to Biltz as much as 20 per cent. It is doubtful, however, whether these estimates can be used comparatively; as we have no evidence that the morphia in all the cases was equally pure.

The physical properties of opium are generally taken from the Smyrna opium. There are certain qualities, which belong, however, more or less to all. The odour is strong, peculiar and characteristic in all the varieties, but in some more so than in others. The taste is very bitter, and somewhat pungent, exciting irritation in the lips and tongue when chewed for any length of time. The best opium does not undergo any change by keeping, excepting that it becomes harder; and this change it is important to bear in mind, inasmuch as there must be great diversity in the strength according to the degree of dryness; hence, some of the Colleges have directed, that the preparations of opium shall be made from the powder. Some of the coarser kinds of Turkey opium, and the common Bengal variety in balls, are apt to become mouldy after a time; and the latter, as well as Persia opium, never seems to harden thoroughly under exposure to the air, which has been supposed to be owing to the admixture of oil. (*Christison.*) When thoroughly dried, it can be reduced to powder, but as it attracts moisture from the air, and becomes lumpy, the powder should be kept in well stopped bottles.

The quantity of opium used in various parts of the world is astonishing. Allusion has already been made to that consumed by the Chinese prior to the late interdiction of its use. In England, the quantity, on which duty was paid in the year 1841, was 37,960 pounds; and in the year preceding, it was 45,589 pounds; the greater part of which was imported from Turkey. (*Pereira.*) From the treasury returns of the United States for the year 1829, it appears that the value of opium imported from the Turkish dominions was 92,924 dollars; from Mediterranean France 12,187 dollars, and from every other part of the world 2,040 dollars. None was imported from India. (*Wood & Bache.*)

Water dissolves about two-thirds of Turkey opium, including a great proportion of its active ingredients; alcohol nearly four-fifths of its weight, and all its active constituents. Sulphuric ether dissolves little more than one of the active principles, which is not soluble in water—the narcotin; and the dilute acids, both mineral and vegetable, entirely exhaust it of its virtues. It contains a great variety of principles, and has received much attention from the analytical chemist, from whose labours it results, that it has at least the following constituents:—morphia, narcotin, codeia, narcein, meconin, thebain or paramorphia[?], pseudomorphia, meconic acid, brown acid extractive, sulphuric acid, resin, fat oil, gummy matter, caoutchouc, albumen, odorous principle and lignin. (*Pereira.*) The most important of these are morphia, codeia, and narcotin, of which the first is an officinal preparation, and will be described hereafter. They are all of modern discovery. Of the six crystalline principles, morphia, codeia, and paramorphia, narcotin, narcein, and meconin, the three first are alkaline, and the others neutral.

CODEIA OR CODEINE, the preparation of which is given by the author elsewhere, (*New Remedies*, 3d edit. p. 151, Philad. 1841,) is a white crystalline solid, soluble in water, alcohol and ether; uniting readily with acids; and, with the chlorohydric especially, forming a salt which crystallizes with great facility; 1000 parts of water, at 60° Fahrenheit, dissolve 12.6 parts of codeia; the same quantity at 100°, 37 parts, and at 212°, 58 parts.

The experience of different observers on the effects of codeia on the economy has been discordant. Magendie states, that it causes sleep, and, in large doses, stupor. He considers one grain of codeia equivalent to half a grain of morphia. Two grains often excited nausea and even vomiting. A *syrup*, each ounce containing two grains of codeia, has been given in hooping-cough, and in other diseases in which opium has been found useful; and it has been found serviceable by Dr. Miranda, of the Havana, in cases of what he terms "powerful nervous irritations of the mucous membrane of the stomach." The chlorohydrate has been used in Philadelphia, but it has not been found to have any virtues, not equally possessed by the salts of morphia, whilst it has the objection that the price is enormous—as much as four dollars the drachm. (*New Remedies*, p. 155.)

Narcotin or narcotine is commonly procured either from the aqueous extract of opium by means of ether, which only dissolves the narcotin, and, consequently, requires but to be evaporated to obtain it; or from crude opium, which has been exhausted by cold water. It may hence be obtained from the residue after the preparation of the aqueous extract of opium of the shops. (*New Remedies*, edit. cit. p. 349.) It crystallizes in very white needles; is devoid of taste and smell; neutral; insoluble in water, but soluble in ether, boiling rectified spirit, and dilute acids. By its not affecting vegetable colours, it is readily distinguishable from both morphia and codeia.

The views in regard to the medical properties of narcotin have been contradictory. Magendie was of opinion, that morphia is the sedative or anodyne principle of opium, narcotin the exciting. Orfila, on the other hand, entertained various notions in regard to it,—at one time believing it to be inert, at another, to have the same action as morphia; and at another, to concur, when combined with morphia, in the properties of opium, but to a slight degree only—since opium, deprived of narcotin, is not less deleterious—and to possess another *modus operandi* than opium, without, however, his being able to regard it as the exciting principle. Others, (*Bally*, *Roots*,) have given it in large doses without any narcotic effect having been induced by it; and hence it has been imagined, that the narcotin of the earlier experimenters was an impure article. Owing to all the uncertainties appertaining to it, narcotin is but little employed in medicine. It would seem, however, that the exciting properties of opium do not belong to it exclusively, for—as elsewhere remarked—there are many persons who are as disagreeably affected by morphia alone as they are by opium, which contains both morphia and narcotin. Recently, narcotin has been employed as an antiperiodic in the treatment of remittent and intermittent fevers. (*See* Tonics.)

The other constituents of opium are not of much, if any, therapeutical interest. Narcein, meconin, pseudomorphia, and meconic acid appear to be inert, and, according to Magendie, thebain or paramorphia, when injected into the jugular vein, or placed in the pleura of an animal, causes tetanus and death in a few minutes.

The therapeutical effects of opiates in different doses have been briefly referred to, under the general observations on the class of Narcotics. That they are excitant in a small dose is admitted by all; and that they are sedative in a large dose is equally admitted by most observers. A grain of opium, which is an ordinary dose, first of all excites the organic actions, but this excitement is followed, in the generality of cases, and in a short time, by sedation. The animal functions are likewise exalted along with the organic, so that sensibility and muscular motion are exerted with more vigour; but this excitation is sooner or later followed by a disinclination to movement, and a decided tendency to sleep. Usually, during the period of excited action, the mouth is dry and clammy, and the individual therefore thirsty; the appetite is impaired—the secretions and peristole of the intestinal canal seeming to be diminished, so that constipation ensues. Hence, in the healthy state of the frame, as well as in certain conditions of diarrhœa and dysentery, small doses of opium are often used as indirect astringents. When larger doses are administered,—say from two to three grains, or more,—the excitement of the animal and organic functions may still be perceptible in the first instance; but commonly the excitation persists for a very short time, and is succeeded by a marked sedative influence and a state of dreaminess followed by stupor, and ultimately by an irresistible desire to sleep. When sleep is not caused by it, and a full dose has been taken, the patient is often amused—and at times annoyed—with the multitude of fantastic groups, which he can frequently call up at pleasure. In many cases, when the effects of the opiate pass away, more or less disturbance of the functions of the stomach and bowels remains, with languor and listlessness.

When given to a still greater extent, opium and its preparations are narcotic poisons; they are the types, indeed, of the class. In such large doses, no signs of excitement are perceptible, the first evidences of the poisonous action being giddiness and stupor, which rapidly increase so that there is a suspension of all mental and moral manifestation,—the individual appearing to be in a deep coma, breathing slowly; the eyes closed, and the pupils contracted. Unless relief is obtained, the countenance assumes a ghastly character, the pulse becomes more and more feeble, the muscles are exceedingly relaxed, and death closes the scene. Should he, on the other hand, recover from this state of coma, it generally passes into deep sleep, which usually terminates in from twenty-four to thirty-six hours, and is followed by nausea, vomiting, giddiness, and loathing of food. (*Christison*).

Opium does not affect all persons alike. There is perhaps no article of the materia medica, which disagrees with so many individuals, or in other words, which so often produces effects on the system not desired by the physician; and frequently there is a capriciousness in this respect, which is as strange as it is inexplicable;—opium itself or some of its preparations producing disagreeable impressions, whilst congenerous preparations have all the pleasant and soothing operation that is desired. These disagreeable phenomena are—instead of sleep or a placid condition,—fever, quick pulse, headache, restlessness, watching at times, delirium, nausea and vomiting. They are considered to be—and, doubtless, usually are—the result of idiosyncrasy; but a recent writer (*Christison*) asserts, that he has known them induced in those with whom opium in general agrees, if they happened to take it in too large a dose, or soon after a full meal with more than an ordinary allowance of wine. Perhaps the preparation, that is the least likely to produce these results, is the muriate or one of the other salts of morphia; the black drop is, also, an excellent preparation; and the author has often found the *Tinctura Opii camphorata,* and the *Pulvis Ipecacuanhæ compositus* succeed, when opium in substance, or the *Tinctura Opii,* could not be tolerated.

In regard to the susceptibility of individuals to the action of opiates, there is much diversity. Some resist large quantities, and it has been shown, (p. 347,) that by habit the endurance or tolerance becomes astonishing. Others, on the contrary, are affected by the smallest quantities. This has to be discovered by observation of particular cases; and a single dose is sufficient to communicate the important information. It is essential, however, to bear in mind, that infants are extremely impressible to its action, and that a drop of laudanum cannot always be administered with safety to an infant a few weeks old. The action, too, is modified according to the surface to which it is applied. The full effect is induced when taken into the stomach. When thrown into the rectum, the general rule is to give it in three times the quantity that would be administered in the same case by the mouth. This rule has, however, been strongly objected to as one of universal application, and there may be cases in which the practitioner might be surprised to see unusual effects induced by it, but such a case has never fallen under the author's observation. "It is conceived"—says a very recent writer—"in some continental countries, especially in France, that it acts three or four times more energetically through the rectum than by the stomach. This must be an error; for in Britain it is not uncommon to give sixty minims of laudanum or four grains of opium by the rectum,—doses which, according to the French view, ought to occasion always alarming symptoms, and sometimes even death." (*Christison.*) A safe plan would be, to inject the same quantity—if a full dose—as would be prescribed by the mouth, and repeat the dose every half hour, unless its effects were apparent.

It is in disease, however, that we witness the most anomalous resistance to the action of opium. It can rarely happen, that the patient is rendered more impressible to it; and in a large class of diseases the resistance to it is so great, that, occasionally, enormous doses are needed. For example, in spasmodic affections, such as tetanus, hydrophobia, neuralgia,—and indeed in other neurosos—as mania, delirium tremens, &c. the quantities required to produce the narcotic effects of opium are often enormous; and even when the erethitic condition of the nervous system has been overcome, no phenomena may exist indicating that a narcotic has been taken.

When applied to the denuded skin or endermically, opiates do not act as energetically on the system, as when administered by the mouth or rectum; but not unfrequently, where opium disagrees with the individual, the endermic application can be tolerated, and all the beneficial results of the narcotic be obtained.

The effects of opium, when received into the air tubes in the form of smoke, we have no opportunity for observing, except in the way of experiment. By the Orientals, it is employed in enormous quantities. The Chinese use an aqueous extract for this purpose, which they term *Chandoo*, and the effects would appear to be the same as when swallowed; yet, as Dr. Christison has remarked, opium is known to be decomposed by such a heat, as is necessary in the process of smoking a pipe, and none of its active principles are volatilizable. He adds, that several of his pupils have tried the process with a Chinese pipe, and Chinese extract, but experienced no other effects than severe headache and sickness.

The remarks made as to the therapeutical application of narcotics apply rigidly to opium; and the great point to be borne in mind is,—the difference in its action according to the dose in which it is given; excitant—as we have seen in a small dose; sedative, in a large.

In fever—as elsewhere remarked, (p. 349)—it is beneficial under numerous conditions, especially where there is insomnia, great restlessness, low delirium, or tremor. Where much cerebral disturbance exists, it has been advised to give it in combination with the tartrate of antimony and potassa. Still, the main effective agent is the opium. Its valuable sedative influence renders it well adapted for many inflammatory diseases; although, at one time, when its *modus operandi* was less understood, it was carefully avoided in those diseases, under the idea, that it might induce undue excitement. Not only does it diminish the over-excited organic actions, but it lessens pain, and causes sleep.

After blood-letting has been employed, a full dose of opium is often one of the most precious sedatives that can be prescribed.

In the inflammations of the lining membrane of the intestinal canal, opium is a most valuable remedy. In simple diarrhœa, it is often employed alone, or associated with chalk and aromatics; in ordinary cholera morbus, a full dose frequently relieves almost instantaneously; and in dysentery, its combination with calomel is often advantageous. In too great secretion from the mucous membrane of the bowels, it allays, by its sedative agency, the inflammatory or other irritation, and thus diminishes the secretion, and, at the same time, the increased peristaltic action. In encephalitis alone, doubt might exist as to the propriety of its administration, and some have pronounced it to be positively injurious in that form in which the cerebral substance is inflamed, and indeed in inflammation of the parenchymatous tissue of organs in general; but although more caution may be required in encephalitis in its administration, there is little, if any, reason for the belief, that it is injurious in parenchymatous inflammation, provided it be prescribed with a due knowledge of its properties; indeed, it has been before shown, (p. 337,) that in pneumonia, its administration is often attended with signal advantage, when given in appropriate doses.

In acute rheumatism it has been prescribed largely, and with much benefit, both alone, and when associated with ipecacuanha; and a full dose often arrests an ordinary catarrh or inflammatory sore throat at its very inception.

In the various neuroses, it has been copiously administered. In mania, for example, the excessive excitement has been overpowered by full doses of opiates; and in delirium tremens, it has been, by many, considered almost a sheet anchor. It is, however, in spasmodic diseases, that it is most trusted to. In every variety of these, it is used beneficially, and in the more violent as tetanus, hydrophobia, &c.,—although too often insufficient—more trust is reposed in it than in any other remedy. But it is almost impracticable to point out the numerous cases in which this invaluable anodyne and hypnotic is capable of rendering service. A due knowledge of its properties cannot fail to suggest those in which its operation will be beneficial.

When employed topically, it is chiefly with the view of relieving pain, although its anodyne and other virtues are not readily exerted through the cuticle. In cases, however, in which there is cutaneous ulceration or abrasion of any kind, the anodyne effect is signally apparent. It is prescribed in certain cases of ophthalmia, in painful ulcerations of all kinds, and in painful chronic cutaneous diseases; and a recent writer (*Christison*) affirms, that both in erythema and in all kinds of erysipelas —even idiopathic erysipelas of the face—the best of all applications, not merely for allaying pain, but likewise for arresting the local inflammatory action, is a lotion made by preparing an infusion of 32 grains of *opium*, and a solution of as much *acetate of lead*, each in four ounces of *water*, then mixing the solutions, and filtering the mixture to separate the insoluble meconate of lead. Opiate frictions have likewise been used in chronic rheumatism, in sprains and in deep-seated painful affections in general, no matter of what character. It is moreover employed in similar cases in the form of plaster; is applied to the bottom of a carious tooth; and added to the most varied topical applications,—always, however, with the view of allaying pain or irritation.

The dose of opium varies, according to the effect which it is desired to induce. As an excitant narcotic, it may be given to the amount of a quarter or half a grain. To induce its ordinary anodyne and hypnotic effects, the dose is a grain or a grain and a half; and a full dose, capable of exciting all the sedative operation of the narcotic, is from two to four grains. The last quantities should only be given, however, where pain is inordinate; spasm severe; or where a powerful sedative influence is needed after blood-letting. It is usually prescribed in the form of pill. At times, it is used as a suppository,—four or five grains being formed into a cylinder with soap, and introduced into the rectum, in painful affections of the uterus or rectum.

PIL'ULÆ O'PII, PILLS OF OPIUM. (*Opii*, pulv. ʒj; *Sapon*. gr. xij; to be divided into 60 pills.) Each of these contains a grain of opium; the soap serving no other purpose than to communicate the proper consistence.

In the last edition of the Pharmacopœia of the United States, an analogous formula has been introduced under the name **PIL'ULÆ SAPO'NIS COMPOSI'TÆ**, or **COMPOUND PILLS OF SOAP.** In this, half an ounce of *opium* in powder, is beaten with two ounces of *soap* so as to form a pilular mass. The object of this formula is to have an opportunity of prescribing opium in cases where it is deemed advisable that the patient should not know he is taking it.

CONFEC'TIO O'PII, CONFECTION OF OPIUM. (*Opii*, pulv. ʒivss; *Pulv. aromat.* ℥vj; *Mel. despumat.* ℥xiv.) This is a relic of the old *Philonium*, and has been much used, but is not so at present.

The aromatic powder, associated with the opium, renders it an excitant narcotic, and adapted for cases of flatulent colic, and for atony of the digestive organs. It is most frequently, perhaps, prescribed in cases of diarrhœa, unaccompanied by vascular excitement. When added to cinchona or to sulphate of quinia, it is said to increase greatly their efficacy in obstinate intermittents. About 36 grains of the confection contain one grain of opium.

TINCTU'RA O'PII, TINCTURE OF OPIUM. (*Opii*, pulv. ℥iiss; *Alcohol.*

dilut. Oij.) *Laudanum*—for so the tincture of opium is commonly termed—is more frequently used than any other preparation of opium, and this mainly owing to the facility with which it can be given.

About one grain of opium may be contained in about thirteen minims of the tincture, although it is not easy to fix upon the exact proportion. Twenty-five ordinary drops are generally regarded as equivalent to a grain of opium.

The dose varies from twenty-five drops to a hundred. The tincture should always be clear. When not so, it is owing to the deposition of opium, which may add materially to the strength, if it be shaken.

TINCTU'RA O'PII ACETA'TA, ACETATED TINCTURE OF OPIUM. (*Opii*, ʒij; *Aceti*, f. ℥xij; *Alcohol.* Oss.) This preparation is prescribed in the same cases as the *Acetum opii* or *black drop*. Its dose is ten minims, or about twenty drops, which are considered to be equivalent to a grain of opium.

TINCTU'RA O'PII CAMPHORA'TA, CAMPHORATED TINCTURE OF OPIUM. (*Opii*, pulv.; *Acid. Benzoic.* āā ʒi; *Ol. anisi*, f. ʒj; *Mel. despumat.* ʒij; *Camphor.* ℈ij; *Alcohol. dilut.* Oij.) This is the well known *Paregoric Elixir*, much used in popular practice. It is an agreeable preparation owing to the aromatic and saccharine additions, which likewise cause it to agree, at times, with persons when the tincture of opium cannot be tolerated. By reason of the comparatively small quantity of opium contained in it, it is not well adapted for cases in which powerful opiates are indicated; but it is greatly used where gentle opiates are required—as to allay cough, and to procure sleep in children. Rather less than half a grain is contained in half a fluid ounce of the tincture. The ordinary dose for an adult is a fluid drachm, or an ordinary teaspoonful.

VINUM O'PII, WINE OF OPIUM. (*Opii*, pulv. ʒij; *Cinnam.* contus.; *Caryophyll.* contus. āā ʒj;. *Vini*, Oj.) This is the *Laudanum of Sydenham*, in contradistinction to the *Laudanum* or *Liquid Laudanum* just described. Wine dissolves the active properties of opium, and the aromatics may adapt it for cases in which the Tinctura opii disagrees. It is not much used, however, internally. It has been dropped on the conjunctiva in turgid states of the vessels of that membrane, and with decisive advantage, especially where there has been great sensibility. The dose of the wine for internal administration is the same as that of the Tinctura opii.

ACE'TUM OPII, VINEGAR OF OPIUM, BLACK DROP. (*Opii*, in pulv. crass. ℥viij; *Myrist.* in pulv. crass. ℥iss; *Croci*, ℥ss; *Sacchar.*

℥xij; *Acet. destillat.* q. s. The opium, nutmeg and saffron are digested in a pint and a half of distilled water for forty-eight hours, and strained. The residue is digested in an equal quantity of distilled vinegar for twenty-four hours. The whole is then passed and repassed by displacement, until it comes away quite clear; and distilled vinegar, enough to make the whole three pints, is passed through likewise. The sugar is then added, and the whole evaporated to three pints and four fluid ounces.)

This is essentially a solution of the principles of opium in vinegar, rendered slightly excitant by the nutmeg, and coloured merely by the saffron. It is the officinal *black drop*, and is intended as a substitute for the celebrated empirical medicine,—called by the same name, and sometimes the *Lancaster* or *Quaker's Black Drop*. It is adapted for many cases in which opium produces its disagreeable effects, and is a very favourite article with many practitioners. It is stronger than the tincture of opium, the ordinary dose being from vj. to xxx. drops.

EMPLASTRUM OPII, OPIUM PLASTER. (*Opii*, in pulv. ʒij; *Picis abietis*, ʒiij; *Emplast. plumbi*, ℔j; *Aquæ bullientis*, f. ℥iv. The lead plaster and Burgundy pitch are melted together; the opium, previously mixed with the water, is added, and the whole boiled over a gentle fire to the proper consistence.)

This plaster is employed to relieve neuralgic and other pains, by being applied immediately over their seat.

Opium forms part of the *Pulvis ipecacuanhæ et opii* of the Pharmacopœia of the United States.

MOR'PHIA.

In the London Pharmacopœia, morphia is directed to be precipitated by the addition of *solution of ammonia* to *chlorohydrate* or *muriate of morphia*, which lays hold of the chlorohydric acid, and separates the morphia. In the Pharmacopœia of the United States, morphia is separated from opium by successive macerations in *distilled water* until the salt of morphia is extracted. The fluid of the macerations is then mixed and filtered; and *alcohol* and *solution of ammonia* are added, by which the meconate or other salt of morphia is decomposed; the alcohol dissolving the colouring matter as soon as it is separated by the ammonia; and the morphia itself being, consequently, precipitated in a purer state.

The crystals of morphia are colourless, and wholly inodorous. They are scarcely soluble in cold water, and very slightly so in boiling water, but are readily dissolved by boiling alcohol. They have an alkaline reaction, and their primary form is the right rhombic prism. Morphia dissolves readily in dilute acids, neutralizes them, and forms salts, which are for the most part soluble, permanent and crystallizable, and are used in medicine.

On account of its very sparing solubility in water, it is but seldom prescribed, although it has been affirmed by one observer, (*Bally*) that it is equally efficacious with any of its salts. As this, however, is probably owing to the presence of acid in the stomach, and the amount of acid varies, the salts of morphia generally, if not always, at the present day, receive the preference. The dose is one sixteenth to one-fourth of a grain.

1. MORPHIÆ ACETAS.—ACETATE OF MORPHIA.

The acetate of morphia is made by mixing *morphia* in powder, freed from narcotin by boiling in sulphuric ether, with *distilled water*, and then carefully adding *acetic acid*, until the morphia is saturated and dissolved. The solution is then evaporated, and the acetate dried with a gentle heat, and rubbed into powder.

Acetate of morphia, obtained in this way, is amorphous; and not wholly soluble in water, in consequence of its containing a portion of free morphia, which, however, is rendered soluble by the addition of a few drops of acetic acid. It is less soluble in alcohol than in water.

The salts of morphia may be administered advantageously, not only in cases where opium is indicated, but where it disagrees. With many persons, and in many cases, they possess decided advantages over opium, but the author has pretty generally found, that where opium disagreed, morphia and its preparations did so likewise.

By one method of exhibition—the endermic—the salts of morphia can be used where opium and its preparations cannot. This method is adopted, when opium or the salts of morphia cannot be borne internally; and where a blister has been directed in neuralgic and other cases, it is not uncommon to direct the denuded surface to be sprinkled or dressed with a salt of morphia. A quarter of a grain or more is placed upon the cutis vera, and this is repeated should the case require it. In the severer neuralgic and neurotic cases, the quantity applied in this way is sometimes very large. In a case of hydrophobia reported by a recent observer, (*Burne*,) ten grains at a time were sprinkled on a blistered surface with excellent tranquillizing effects. Occasionally, when applied to a blistered surface, for several days in succession, a papular eruption is observed, which has quickly become vesicular, proceeding from the edges of the blister, and gradually spreading over the entire surface. It has been proposed to inoculate with the salts of morphia, which, when thus used—the point of a lancet being dipped in an aqueous solution of the salt—give occasion to the formation of a papula surrounded by an areola and accompanied by itching, which is at its height in about an hour. In one case,—in which thirteen punctures were made on the anterior part of the forearm—the patient experienced heaviness of the head, frequent yawning, clamminess of mouth, and an invincible desire to sleep; yet the quantity of the salt of morphia used could not have been more than a quarter of a grain. It has been suggested, that inoculation with morphia may supersede the use of blisters and ammoniacal plasters. The acetate has also been given in *injection* in cases of chronic diarrhœa, and has been made into an *ointment* to be rubbed over pained parts, or applied immediately to them, where this is practicable. In the dose of a fourth of a grain every half hour it was found by one practitioner, Gérard, to be preferable to every other remedy. He continued it until the serious symptoms—the spasms, diarrhœa and vomiting—had ceased, or reaction ensued. (See the author's *New Remedies*, p. 345.)

The ordinary dose of acetate of morphia is from an eighth to a quarter of a grain, repeated so as to induce the anodyne or hypnotic effect. As in the case of opium, under excessive pain, or long continued use, the system may be so habituated to its action as to bear very large doses. A case has been published in which a female, under a painful affection, took scruple, and—according to her own report—half drachm doses of the acetate. (*New Remedies*, p. 340.)

2. MORPHIÆ MU'RIAS.—MURIATE OF MORPHIA.

The muriate of morphia of the Pharmacopœia of the United States is made by mixing *morphia*, in powder, with *distilled water*, and carefully adding *muriatic acid* till the morphia is saturated and dissolved. The solution is then evaporated, until crystals form upon cooling. These crystals are of a snow-white, feathery appearance, and wholly soluble in water. They are devoid of smell, and of a bitter taste.

This salt of morphia is but little used in this country, but is more prescribed than either of the others in Great Britain. There are some, indeed, here, who prefer it to the sulphate, which is most frequently given with us; but it is probable, that more accurate observation will show, that they are capable of being substituted, in all cases, for each other.

The dose of the muriate is the same as that of the acetate.

3. MORPHIÆ SULPHAS.—SULPHATE OF MORPHIA.

Sulphate of morphia is formed in the same manner as the muriate—*diluted sulphuric* acid being substituted for *muriatic acid.* It is in snow-white feathery crystals, which are wholly soluble in water. The dose is the same as that of the acetate.

LIQUOR MORPHIÆ SULPHATIS, *Solution of Sulphate of Morphia.* (*Morphiæ sulphat.* gr. viii; *Aquæ destillat.* Oss.) This solution undergoes change by keeping, and admits of minute quantities of the sulphate being administered. A fluidrachm, or about a tea-spoonful, contains one eighth of a grain.

Many years ago, a LIQUOR MORPHIÆ CITRATIS was directed to be prepared in the following manner. Beat four ounces of the best crude *opium* in a mortar with two ounces of crystallized *citric acid,* mix well with a pint of *boiling water,* and filter after 24 hours' maceration. This was proposed by Dr. Porter, of England, and is spoken well of by Dr. Paris. Magendie recommends a citrate to be formed more immediately, according to the following formula. *Morphiæ pur.* gr. xvi; *Acid. citric.* crystallis. gr. viii; *Aquæ destillat.* ℥i; *Tinct. coccinell.* q. s. ut fiat solutio. The dose is 20 to 24 drops in the 24 hours.

A TARTRATE OF MORPHIA was suggested by the author's friend, Mr. C. T. Haden, as a substitute for the *liquor opii sedativus* of Mr. Battley, a nostrum. Mr. Haden prepared it by macerating the dregs remaining after making the tincture of opium in a solution of tartaric acid. Forty drops acted in every respect like twenty of the liquor opii sedativus. It neither excited nor induced costiveness.

A *Bimeconate of Morphia* has been introduced by Mr. Squire, of London, and has been highly spoken of as an anodyne and hypnotic, but the formula for its preparation has not been given to the profession. The same may be said of a preparation termed *McMunn's Elixir of Opium.*

2. PAPA'VER.—POPPYHEADS.

Papa'ver somnif'erum, Somniferous or *White Poppy;* SEX. SYST. Polyandria Monogynia; NAT. ORD. Papaveraceæ, is indigenous in Asia and Egypt, and grows wild in some parts of England, having probably escaped from gardens. (*Pereira.*) It is cultivated in oriental countries for the sake of opium, and in Europe for its heads or capsules, as well as for the oil contained in the seeds, which is used in the arts. The heads are obtained generally from the white variety, being the largest, and they are directed by the Edinburgh college to be gathered before they are wholly ripe, because at that time they abound in the milky juice of which opium is made; whilst, if allowed to ripen before they are plucked, as directed by the London and Dublin colleges, the juice is in a great measure exhausted. (*Christison.*)

The heads—as met with in the shops—vary in size from that of a hen's egg to that of the fist, are of a dirty white or purplish-brown colour, of a papyraceous texture, devoid of smell, and have a slightly bitter taste. When subjected to analysis, they contain principles similar to those of opium, which they readily impart to water.

The preparations of poppyheads are exceedingly variable in strength, partly owing to their being gathered at different stages of their growth, and partly, also, owing to differences in the variety of the plant used; and they are, consequently, but rarely prescribed internally. They have been thought, by some, to agree where opium did not, but this is questionable; and they are not adapted for any purposes which opium does not better subserve.

The decoction is much used in Great Britain as an anodyne fomentation, although it has been properly questioned, whether it produce any effect, which would not equally follow the use of a mucilaginous decoction.

3. HYOSCY'AMUS.—HENBANE.

Hyoscy'amus niger, or *Common Henbane;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Solanaceæ; is indigenous in many parts of Europe, and is cultivated for medicinal purposes. It has, also, been introduced into this country, in the northern and eastern parts of which it is found in the vicinity of the older settlements. It flowers in July. The leaves—Hyoscyami Folia, and the seeds Hyoscyami Semen—are officinal in the Pharmacopœia of the United States. It is generally recommended that the plant should be gathered when in flower; but it has been found sufficiently active even in the spring before the appearance of the flowering stem. The wild plant, as in the case of other narcotics, has been esteemed preferable to the cultivated, but Dr. Christison affirms, that, from experiments made at the Royal Infirmary of Edinburgh, the inferiority of cultivated plants, if it exist at all, seems not to be appreciable in practice. The plant is said to be only fit for medicinal use in the second year. The fresh herb has a disagreeable virous smell, and a mucilaginous, slightly acrid taste. The leaves should be dried at a temperature not exceeding 120° Fahr., by which process 100 lbs. of the fresh herb are said to lose 86 per cent.. When dried, they ought to preserve, in some measure, their odour. The seeds have the smell of the plant, and a bitter taste.

Both the seeds and extract have been analyzed, and found to contain a vegetable alkali, almost identical with atropia, to which the name *Hyoscyamia* or *Hyoscyamina* has been given. An empyreumatic oil of henbane, whose properties resemble those of the empyreumatic oil of foxglove, was obtained by destructive distillation, which proved to be a powerful narcotic poison.

In large doses, hyoscyamus is an acro-narcotic poison, occasioning at times—but not so often as belladonna, and stramonium,—nausea and vomiting, purging, disturbance of vision, dilatation of the pupil, coma, and often delirium, followed by death. In medicinal doses, it exerts a soothing influence over the nervous system, without that manifest precursory excitement which is produced by many of the articles of the class. In larger doses still, it acts as an hypnotic; at least such is the general belief. It must be admitted, however, that it frequently fails; and it is affirmed to induce delirium rather more frequently when pushed to a great extent. It certainly is not at all comparable to opium as an anodyne and hypnotic; yet there are cases in which opium and its preparations disagree, and in which henbane may be prescribed as a substitute. For example, opium, even in small doses, occasions, in particular persons, violent cephalalgia, nausea and vomiting, and is apt to induce constipation; none of which phenomena follow the use of hyoscyamus. It is not, however, extensively employed; for whilst one respectable writer, (*Professor Wood*, of Philadelphia,) remarks, that it is "at present used almost exclusively to relieve pain, procure sleep, or quiet irregular nervous action," another, (*Christison*,) states, that "probably the chief consumption of it now-a-days is in combination with those purgatives which cause griping, and more especially with the compound colocynth pill-mass."

It is unnecessary to enumerate the cases in which hyoscyamus is given internally. It would be but repeating what is said under the various narcotics. Wherever an anodyne, hypnotic, or antispasmodic is needed, it is prescribed; and, as already shown, there may be cases in which it may be used when opium cannot be; although whenever the latter can be borne, it is infinitely preferable. Like belladonna, it may be used to dilate the pupil, but it is not so energetic; and like it, it has been employed in the way of injection, and as a fomentation in painful tumefactions and ulcerations.

The dose of the powdered leaves—which, however, are rarely prescribed—is from gr. v. to gr. x.

EXTRAC'TUM HYOSCY'AMI, EXTRACT OF HENBANE, is the inspissated juice of the leaves. 112 lbs. of the fresh plant yield from 4 to 5 lbs., according to one experimenter (*Brande*); according to another, ℔v. ℥ix. (*Squire.*) That used in this country is chiefly obtained from Great Britain, and is very variable in its quality. It is the preparation of henbane, which is most commonly prescribed,—being given internally in the dose of gr. v. to gr. x. or more. It is a common adjunct to the compound extract of colocynth, and to aloes, whose irritating qualities it obviates; so that in pregnancy pills of aloes and hyoscyamus may be taken with safety. Like other narcotic extracts, it may be added to topical applications to tender parts—as to hemorrhoids; and it is occasionally formed into a plaster, which is used in neuralgic pains, glandular and scirrhous swellings, &c.

An **ALCOHOLIC EXTRACT OF HYOSCYAMUS—EXTRAC'TUM HYOSCY'AMI ALCOHOL'ICUM,** has been introduced into the last edition of the Pharmacopœia of the United States (1842.) It is made from the leaves, in coarse powder. The dose is about the same as that of the simple extract, than which it has been regarded as more certain.

TINCTU'RA HYOSCY'AMI, TINCTURE OF HENBANE, (*Hyoscyam. fol.* ℥iv; *Alcohol. dilut.* Oij; prepared either by simple maceration or by displacement.) The dose as an hypnotic is f. ʒj. to f. ℥ij. Should it act on the bowels, it has been suggested, that a very small quantity of the tincture of opium should be added to it, which may be done in cases where opium does not disagree.

4. BELLADON'NA.

Belladonna is the officinal name, in the United States Pharmacopœia, for the leaves of *A'tropa Belladon'na*, *Common Dwale, Deadly Nightshade;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Solanaceæ, a plant, which is a native of Europe, growing in hedges and waste ground on a calcareous soil; flowering in June and July, and ripening its fruit in September. The leaves are usually collected before the flowers bloom or soon afterwards. The root, also, is officinal in the Dublin Pharmacopœia. The dried leaves are of a dull greenish colour, with a feeble narcotic smell, and a subacrid and slightly nauseous taste. They impart their virtues to both water and alcohol.

On analysis, belladonna yields a vegetable alkaloid—*Atropia*—on which the narcotic properties appear to be dependent, and which may be obtained by a process similar to that for procuring aconitia from aconite. This principle has not been admitted into the Pharmacopœias. It is a most virulent poison—a tenth of a grain causing, in the human subject, dryness of the mouth, constriction of the throat, difficulty of deglutition, headache, dilatation of the pupil, and stupor.

Belladonna is a powerful narcotic poison in large doses. To a less extent it possesses the ordinary properties of the narcotics, along with some that are peculiar to itself. When carried to such an extent as to affect the system, it induces dryness of the mouth and throat, vertigo, dilatation of the pupils, dimness of sight; when to a greater extent, delirium, and—it is affirmed—an eruption closely resembling that of scarlatina. To this, reference will be made presently.

The first set of symptoms were induced on the author by tasting some newly prepared extract of belladonna prepared by himself. The dilatation of the pupil continued for a fortnight, becoming gradually less and less, but impairing vision, whilst it persisted. These effects show, that the main effect of the belladonna is exerted upon the organs of innervation; those of secretion become modified subsequently.

Belladonna is administered in many diseases for the purpose of allaying pain, or diminishing the impressibility of the nervous centres or of the nervous cords. In this respect, it is, as a general rule, far inferior to opium, yet there are some diseases in which it occasionally succeeds after opium has failed; for example, in the various forms of neuralgia; in which it is often necessary to push the remedy, until some of the effects above mentioned are induced. Administered in this manner,—like the other narcotics, it has been prescribed in rheumatism.

In diseases characterized by great nervous impressibility, as hooping-cough, it has occasionally afforded relief; but it can only be regarded as a palliative in that singular self-limited disease. A modern writer (*A. T. Thomson*) affords, however, the following strong testimony in its favour:—"I have ordered the extract in doses of one-eighth of a grain to a child of eight years of age, and gradually increased the dose to a quarter of a grain. Its power over the cough is extraordinary. It produces a state of the skin closely resembling scarlatina, accompanied with fever, suffused eye, dimness of sight, and frequently, although not always, headache. Whilst these symptoms continue, the cough remains absent, but it returns as soon as they disappear. By keeping the habit for a sufficient time under the influence of the remedy, the period of the disease has always been greatly shortened."

Belladonna has also been prescribed in epilepsy, mania, hysteria, chorea, and in the neuroses in general; but no marked effect has resulted, except what would probably have equally resulted from the employment of opium or some of its preparations.

Dr. Graves has ingeniously suggested the use of belladonna in cases of fever accompanied with contraction of the pupil, under the view, that the state of the brain, which accompanies dilatation of the pupil, is different from that which accompanies contraction; and hence, as belladonna occasions dilatation of the pupil, its administration may do much towards counteracting the condition of the encephalon that occasions the opposite condition of the pupil. Were this view, however, correct, it would seem equally probable, that as aconite produces contraction of the pupil, it ought to be a remedy for encephalic conditions that are accompanied by dilatation of the pupil; and farther, that aconite ought to be capable of counteracting the dilatation of the pupil occasioned by belladonna. These would be strange results if they really occurred.

The property possessed by belladonna of dilating the pupil adapts it for the treatment of certain diseases of the organ of vision. It is largely used by the surgeons of Europe, both for the purpose of exploration and treatment. In cases of cataract, for example, it enables the surgeon to appreciate its extent; and in obscure diseases, to inspect the depth of the eyeball. In the operation for cataract, it allows of the lens passing out more readily. In iritis, it prevents adhesions between the posterior part of the iris and the anterior part of the capsule of the crystalline, or ruptures them when fresh. It is occasionally, also, used in inflammatory and other affections of the eye, to diminish the sensibility of the organ to light.

For producing dilatation of the iris, a little of the extract may be rubbed with the wet finger round the eyelids, or a solution be dropped into the eye. In a few hours, the pupil generally becomes largely dilated, so much so, that the iris appears, at times, as if it were totally gone. This condition generally continues for a few days.

Owing to its effect upon the iris, its use has been suggested in labour, accompanied with unusual rigidity of the os uteri. With this view, either the soft extract, or an ointment composed of *Extract of Belladonna* ʒj—ʒij; *Spermaceti Ointment* or *Lard*, ℥i. may be rubbed upon the os uteri. It is not, however, much employed. In spasmodic and neuralgic affections of the urethra, bladder, rectum and vagina, belladonna has likewise been used, either applied to a bougie, or passed into the rectum, in the form of injection or suppository. In all cases, it is important that there should be no abrasion—as the belladonna might produce an undesirable narcotic impression upon the system.

In certain painful affections of the chest, and in painful scirrhous and glandular enlargements, a belladonna plaster is not unfrequently applied. Its narcotic influence may be partially exerted in this way; but it is probably but little adapted for the removal of those affections, as was at one time believed.

There is one other application of the belladonna, which remains to be particularly noticed—as a preventive of scarlatina. It has already been remarked, that when given to a certain extent, it is apt to induce a cutaneous efflorescence similar to that of scarlatina. This, of course, suggested to the homœopathist to make trials of the remedy as a prophylactic against that often formidable disease. In another work, (*Practice of Medicine*, ii. 604, Philadelphia, 1842,) the author has stated, that he has never witnessed the eruption, nor does its production seem to be considered necessary where the belladonna has been given as a prophylactic. The testimony, for and against its preventive powers in scarlatina, has been considerable. It is easy to see, however, that inasmuch as all are not attacked, who are exposed to a disease which is unquestionably contagious, any article, exhibited with the view of prevention, may readily gain credit for the possession of such powers, without meriting it. Still more easy is it, in the case of a disease like scarlatina, which many consider spreads by epidemic rather than by contagious influences. The belladonna certainly has often failed, and a striking case of the kind is given by a recent respectable writer (*Sigmond*)—of a family of eleven persons, who took it, yet every one of them was attacked. Hahnemann's direction for exhibiting it in such cases is to dissolve three grains of the *extract* in a fluidounce of *cinnamon water*, and to administer three drops of this solution, twice a day, to a child a year old, adding one drop for every year, until twelve drops are taken for a dose; this course to be adopted at the commencement of the epidemic, and to be persevered in whilst it rages.

The dose of the powdered leaves of Belladonna is one grain, which may be gradually increased until its peculiar effects—dryness of the mouth, dilatation of the pupil, or some of the cephalic phenomena supervene. The powder is rarely, however, given internally. The fresh leaves are sometimes applied warm as a fomentation to pained parts; and, occasionally, an infusion is used for a similar purpose, or the powder is made to form part of a cataplasm.

EXTRACTUM BELLADONNÆ, EXTRACT OF BELLADONNA, This extract is made from the expressed juice of Belladonna. It is the preparation most frequently used. The dose may be a quarter, or half a grain, repeated three times a day, and gradually increased until the constitutional effects of the remedy appear. It has, however, been given in much larger quantities. Its topical uses have already been referred to; but it may be added, that a *decoction* of the extract or of the leaves has been recommended, like other narcotics, as an inhalation in spasmodic asthma.

An **ALCOHOLIC EXTRACT OF BELLADONNA—EXTRAC'TUM BELLADON'NÆ ALCOHOL'ICUM**—has been introduced into the last edition of the Pharmacopœia of the United States (1842.) It is prepared by the action of *diluted alcohol*, by displacement, on *Belladonna* in coarse powder. The fresh leaves are not always attainable, and this formula furnishes a method for obtaining the extract in their absence.

TINCTU'RA BELLADON'NÆ, TINCTURE OF BELLADONNA. (*Belladonn.* ℥iv; *Alcohol dilut.* Oij; prepared by maceration or displacement.) The dose of the tincture is from ♏xx to ♏xl. watching the effects. It is officinal in the Pharmacopœia of the United States, not in Great Britain.

EMPLAS'TRUM BELLADON'NÆ, PLASTER OF BELLADONNA. (*Emplastr. Resin.* ℥iij; *Extract. Belladonnæ*, ℥iss.) This plaster is used as an anodyne and revellent in neuralgic pains, and, indeed, in most painful affections that are deep seated. Dr. Wood states, that he has seen the constitutional effects of belladonna result from its application. Care ought to be taken not to apply it to an abraded surface.

5. STRAMO'NIUM.

Datu'ra Stramo'nium, *Thorn Apple*, or *Jamestown Weed;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Solanaceæ, is met with in various parts of Europe, Asia and America; but its native country appears to be unknown. In the United States, it is very common in the vicinity of every inhabited spot, in waste ground, and on dunghills. It flowers from May to August, according to the temperature. The leaves, Stramonii Folia; the root, Stramonii Radix; and the seeds, Stramonii Semen, are officinal in the Pharmacopœia of the United States. The first are gathered when the flowers are full blown, at which time they possess an unpleasant virous odour, sufficient to produce a disagreeable impression on the olfactories, when the place is approached in which the plant grows. Their taste is bitter and nauseous. The disagreeable odour is lost by drying, but the taste remains. The seeds are small, compressed, kidney-shaped, and of a brown, almost black, colour, without smell, but having the bitter, nauseous taste of the leaves, and a somewhat acrid taste.

All the parts of the plant yield their virtues to water, alcohol, and the fixed oils, which are consequently used in various preparations. The plant has been analyzed by different chemists, and found to contain an active vegetable alkali, to which the name

Daturia or *Daturina* has been given, and which is separated in the same manner as *hyoscyamia.* It dilates the pupil, and is highly poisonous to animals, but is not used in medicine. By destructive distillation, a poisonous oil is obtained, which does not differ in its physical and chemical properties from the empyreumatic oil of foxglove.

Stramonium is a powerful narcotic, producing effects like those of belladonna, when taken in large doses,—as dryness of the throat, and delirium, followed by coma, with dilated pupils, and at times convulsions. In medicinal doses, it appears to resemble hyoscyamus; to be anodyne, and, to a certain extent, hypnotic; rather tending to relax the bowels than to constipate, and agreeing where opium cannot be borne. Still, for internal use, it is less employed than the other narcotics already considered, although it may be used in the very same cases.

In spasmodic asthma—as elsewhere shown—it is made to come in contact with the pneumogastric nerves by inhalation, with marked advantage,—the benefit resulting, in such cases, from its narcotic influence. Like the other narcotics it is also used externally, the leaves being applied warm to painful tumours, irritable ulcers, &c. For the purpose of dilating the pupil, as well as of diminishing the sensibility of the retina to the influence of light, belladonna is more used in Europe: in this country, the extract of stramonium is often employed. The dose of the powdered leaves is two or three grains; that of the seeds, a grain, repeated until the constitutional influence is manifested, or until some effect is exhibited on the morbid phenomena.

EXTRACTUM STRAMO'NII FOLIO'RUM, EXTRACT OF STRAMONIUM LEAVES. This is the inspissated juice evaporated.

EXTRACTUM STRAMO'NII SEM'INIS, EXTRACT OF STRAMONIUM SEED. This is obtained from stramonium seed by the process of displacement, through the action of dilute alcohol. It is the *alcoholic extract of the seed,* and is preferable to the first. The dose of the first is a grain; of the last half a grain, gradually increased. When applied to the eye to induce dilatation of the pupil, in the same cases as the extract of belladonna, it may be softened and gently rubbed over the eyelid, or a solution may be dropped into the eye.

TINCTU'RA STRAMO'NII, TINCTURE OF STRAMONIUM. (*Stramon. sem.* contus. ℥iv; *Alcohol. dilut.* Oij. Prepared either by maceration, or by displacement.) The dose is ♏x to ♏xx, two or three times a day, until some effect is induced. It may be given wherever stramonium is indicated.

UNGUENTUM STRAMONII, OINTMENT OF STRAMONIUM. (*Stramon. fol. recent.* concis. ℔j; *Adipis*, ℔iij; *Ceræ flavæ*, ℔ss. The leaves are boiled in the lard until they are friable, then strained, and to the product, the wax, previously melted, is added.) This ointment is used as an anodyne application to painful ulcers, hemorrhoids, &c., and is a great favourite with some surgeons, being prescribed in cases where others would use nothing more than simple cerate.

6. CONIUM.—HEMLOCK.

Both the leaves, Conii Folia, and the seed or fruit, Conii Semen, of the *Coni'um macula'tum*, are officinal in the Pharmacopœia of the United States. The plant, called also *common* or *spotted hemlock;* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ, is indigenous in Europe, and has been naturalized in the United States, and also in Chili, growing usually in waste grounds, and by the roadsides, especially near inhabited places. It flowers in June and July, and the fruit ripens in August and September. The whole plant has an exceedingly disagreeable virous smell, compared by some to that of mice; by others to that of cantharides, or of the urine of the cat, by which it may be distinguished from other umbelliferous plants. Its proper characteristics are, however, botannical. The plant is considered to be more active in warm countries, and in hot and dry seasons. The leaves are generally gathered when the plant is in full flower, or even later, when the fruit is forming. Dr. Christison, however, affirms as the result of his experiments, that there seems to be no great difference in its poisonous properties at any season, as even in November and March of its first year its activity is very great. The same gentleman remarks, that, contrary to the opinion of Geiger, the seeds have always appeared to him to be considerably more active when green than when ripe and dry: they are much more active than the leaves, and he considers this an objection to the adoption of the seeds by the London College as an article of the Materia Medica, and the remark would of course apply equally to the Pharmacopœia of the United States—unless they were used for some special purpose different from those to which the leaves are applied. A great advantage, however, of the seeds would seem to be, that they retain, for a much longer time than the leaves, their active principle unchanged.

Hemlock leaves, when dried at a temperature not higher than 120° Fahr., and with exclusion of solar light, have a fine green colour, and the characteristic smell of the plant. They should be preserved in tin canisters well closed. It would seem, however, that but little reliance can be placed upon the dried leaves, as, however carefully prepared, they sometimes yield none of the active principle, *conia*, even although they may have a fine green colour, and the hemlock smell. (*Pereira.*) The taste is nauseous, but much less so than that of the fresh plant. The seeds have very little odour, and a slight, somewhat bitter, and nauseous taste.

Conium has been repeatedly subjected to chemical analysis, but without any great advantage to pharmacology. One of the most curious results was obtained by Schrader, who found the analysis of the hemlock and cabbage to be strikingly analogous! When subjected to distillation, a volatile oil, of an acrid taste and of the peculiar odour of the plant, passes over, which is not, however, poisonous; hence, the smell of the leaves would be an unsatisfactory test of their activity. When triturated with a solution of potassa, an intense and peculiar odour is exhaled, arising from the disengagement of the active principle *Conia, Conein, Conicin* or *Cicutin*, which is supposed to be present in combination with an acid, and requires the agency of an alkali to disengage it. It is possessed of wonderful activity as a poison. It cannot be procured from the dried leaves; but may be from the dried fruit. (*Pereira, Christison.*)

Conium is one of the narcotics so strongly extolled by Störck in cancerous affections, not simply with the view of its narcotic action, but as a modifier of the system of nutrition, or a eutrophic. At the present day, however, the latter action has been more properly referred to the therapeutical agents prescribed with it, for the belief of its '*deobstruent*' operation has now altogether passed away in the opinion of the best observers.

In regard to its precise operation on the encephalo-spinal system, and the phenomena induced by it, discordance of sentiment exists,—so much so, that a very recent writer (*Christison*) expresses the opinion, "that the entire subject of the medicinal actions and uses of hemlock requires to be investigated anew; and it well deserves investigation, considering its singular energy and peculiar effects as a poison."

Cases are on record, in which the leading symptom produced by it was coma: others have ascribed convulsions to it. On the other hand, the experiments of Dr. Christison led him to infer, that it does not excite convulsive spasms, or bring on insensibility; but that it exhausts the nervous energy of the spinal chord and voluntary muscles, occasioning merely convulsive tremors and slight twitches, and eventually general paralysis of the muscles, and consequent stoppage of the breathing. He found, however, that it leaves the heart's action unimpaired, and does not prevent the blood from coagulating—as was at one time imagined—any more than other causes of death by asphyxia. On the other hand, however, Mr. Judd infers from more recent experiments with medicinal doses on cats and other animals, that the well-made extract causes great languor and drowsiness, and often profound sleep for two or three hours, lessens muscular excitability, and reduces the circulation as well as the animal heat. He is, consequently, induced to believe, that it really deserves the reputation it has enjoyed with many, of being an efficient anodyne and hypnotic; he adds, that on some trials with it in affections of the chest, he found it to allay cough and promote sleep, and he considers it especially applicable to the treatment of hypertrophy of the heart, phrenitis, and other affections attended with an excited or excitable state of the circulation. (*Christison.*)

The author has given the remedy a fair trial in various painful affections, but he has been extremely dissatisfied with it; and is disposed to think, as the result of his observations, that it is often altogether inert. It is used internally, in the same cases as the narcotics already described; and a *fomentation* of fresh hemlock leaves; or a *poultice* of the extract or of a decoction of the leaves; or a hemlock *ointment* or *plaster* is not unfrequently used to allay the pain of malignant ulcerations, or of neuralgic suffering.

Like some of the other remedies of the class, it has been supposed to possess antaphrodisiac virtues, and has, consequently, been prescribed in cases in which there was over-excitement of the venereal appetite.

The ordinary dose of powdered conium is three or four grains, twice or thrice a day—the dose being gradually increased, until some degree of cephalic uneasiness is experienced. The powder, however, speedily loses its virtues, and different specimens appear to have different potency; so that care may be necessary, if a different specimen of the same preparation be given, that an overdose be not prescribed.

EXTRAC'TUM CONI'I, EXTRACT OF HEMLOCK. This extract is prepared from the inspissated juice,—too much pressure being avoided—as the extract, obtained in this manner, is less active. (*Brande.*) It is the preparation most frequently employed, yet it is extremely unequal and always uncertain. Indeed, most of the extract of conium of the shops is wholly inert. (*Pereira.*) It is considered to be of good quality only when it disengages the odour of conia, which is strong and penetrating, something like that of hemlock,—but more analogous to that of a combination of the odour of tobacco and mice. (*Pereira.*) It does not, however, contain much conia at any time. From ℥iv. of the extract, obtained by Dr. Pereira from one of the most respectable druggists in London, he was unable to procure any sensible quantity of it. It would appear, that in the process of evaporation the conia is decomposed; and that in the very best extracts, it disappears after they have been kept for some time. When we take all this into account, with the differences in the plant itself, according as it is wild—which is the most active—or cultivated, or as it is culled at different periods, it is obvious that no great dependence can be placed upon the greater part of the commercial extract. One cwt. of the leaves yields from three to five pounds of extract.

The ordinary dose is two or three grains, gradually increased until some constitutional effect is induced. It is usually given in the form of pill.

The United States Pharmacopœia (1842) has an **ALCOHOLIC EXTRACT OF HEMLOCK—EXTRAC'TUM CONI'I ALCOHOL'ICUM**—which is made from the dried leaves, like the alcoholic extract of belladonna. It is applicable to the same cases as the ordinary extract, for which it is a substitute, although it is probably even less satisfactory.

TINCTU'RA CONI'I, TINCTURE OF HEMLOCK. (*Conii fol.* ℥iv; *Alcohol. dilut.* Oij; prepared by maceration or by displacement.) The Edinburgh College prepares a tincture from the expressed juice, which, for the reasons before given, must be much more active than the tincture of the dried leaves. The dose is from f. ʒss. to f. ʒj. A *tincture* of the dried fruit or seed has been proposed, which would necessarily be more active.

7. ACONI'TUM.—ACONITE.

In the Pharmacopœia of the United States, (1842,) aconitum is defined to mean "the leaves of *Aconitum napellus* and of *A. paniculatum*, (*De Candolle.*)" *Wolf's bane* or *Monk's hood.* The Dublin College adopts the *A. panicula'tum* as officinal, and directs the leaves to be used: the London College directs, in addition, the root to be employed; and the Edinburgh, the leaves of *Aconi'tum napel'lus.* They belong to Sexual System, Polyandria Trigynia; Nat. Ord. Ranunculaceæ; are indigenous in Europe, where they are often cultivated in the gardens, and are seen occasionally in those of this country. The leaves are usually collected when the flowers begin to appear, or shortly before.

Neither the leaves nor the root of aconite have any smell, but when chewed, they slowly occasion a strange sense of tingling and numbness in the tongue and interior of the mouth. The root is gathered in the spring, just before the leaves appear. The expressed juice, as well as the alcoholic extract of the leaves, possesses all the properties of the plant. The watery extract is regarded as a precarious and very irregular preparation. (*Orfila, Christison.*)

Aconite yields, on analysis, a peculiar alkali termed *Aconit'ia* or *Aconiti'na*, and a volatile acrid principle, which is readily decomposed.

It is an active poison of the acro-narcotic class, producing, in small doses, the tingling and numbness already mentioned, and in larger doses, symptoms of gastric irritation, accompanied or followed by signs of narcosis—as stupor, convulsions, coma, and death. Small and repeated doses of the alcoholic tincture of the root, taken internally, are said to cause a sensation of heat and tingling in the extremities, and occasionally slight diuresis. (*Pereira.*) Unlike belladonna and stramonium, when applied to the eye, it induces contraction of the pupil; and the powers of the circulation appear to be depressed by it.

Störck of Vienna first introduced this remedy, as well as others of the class, to the notice of physicians, and it was employed in numerous diseases; the chief of which were rheumatism, gout, scirrhus and cancer; but it is now rarely administered. Owing to its sedative influence on the circulation, it has been given in hypertrophy of the heart.

It has, likewise, been largely employed *externally*. In neuralgia, it has been extravagantly praised by some; a single application of the tincture, it is said, producing amelioration, and a few applications an entire cure. (*Pereira.*) It must be admitted, however, that it often fails—as often, indeed, as any other narcotic. In rheumatic affections, it has also been of great service. Those of the chronic kind have been most benefited; but cases of acute rheumatism have likewise been greatly relieved.

The dose of powdered aconite is one or two grains, which may be gradually increased until its effects are apparent. When good, it causes the tingling and numb sensation before described.

TINCTU'RA ACONI'TI, TINCTURE OF ACONITE. (*Aconit.* ℥iv; *Alcohol. dilut.* Oij: prepared either by maceration, or by displacement.) The dose of the preparation is five drops, given three or four times a day; but its effects should be carefully watched. It is applied as an embrocation in neuralgia and rheumatism, by means of a small piece of sponge attached to the end of a stick. Dr. Pereira states, that the use of an aconite plaster, made by spreading the soft alcoholic extract on adhesive plaster, in neuralgia, has been suggested to him.

EXTRAC'TUM ACONI'TI ALCOHOL'ICUM, ALCOHOLIC EXTRACT OF ACONITE. This is made by distilling off the alcohol from the tincture of aconite, until the extract has the proper consistence. The ordinary dose is one-sixth of a grain, made into a pill with crumb of bread. It has been given to a greater extent in articular rheumatism,—half a grain every two hours, gradually augmenting the dose. (*Lombard*).

An AMMONIATED EXTRACT OF ACONITE has also been advised to be applied externally. (*Turnbull.*) It is made by evaporating very carefully, and at a low temperature, a tincture of the dried root of the plant to the consistence of an extract; adding to every drachm of this eight or ten drops of liquor ammoniæ, and allowing the mixture to stand a short time in a very gentle heat, to drive off the excess of ammonia. It is used in the form of ointment, composed of one drachm of the *ammoniated extract* to three drachms of *lard.* When this ointment is rubbed upon the skin, it occasions a pungent sensation like that produced by aconitia ointment. In less severe cases, Turnbull advises the application of a simple saturated tincture of the dried roots, with or without the addition of a little ammonia. An ointment of the simple alcoholic extract is sometimes used, composed of one part of the *extract* to two parts of *lard.* It may be spread on adhesive plaster.

ACONITIA, ACONITINE. The active principle of *Aconitum* has been brought forward with overstrained eulogies of late years. They have been sufficient, however, to introduce a formula for its preparation into the last edition of the London Pharmacopœia. This consists in exhausting *aconite root* by means of *alcohol;* distilling off the spirit until the extract remains; dissolving this in water and filtering; evaporating the solution to the thickness of syrup; adding *dilute sulphuric acid* mixed with distilled water to dissolve the aconitia; next dropping in *solution of ammonia,* and dissolving the aconitia thrown down in *dilute sulphuric acid,* mixed, as before, with water; adding *animal charcoal,* and shaking; lastly, filtering and dropping in *solution of ammonia* to precipitate the aconitia, which is finally washed and dried.

This substance is of a white colour; inodorous, and of a bitter taste, leaving behind it an acrid but not burning sensation in the throat. It is uncrystallizable, requires one hundred and fifty parts of water at the ordinary temperature to dissolve it; but only fifty parts of boiling water.

Aconitia is a most virulent poison—said to be the most so known, not even excepting hydrocyanic acid,—one-fiftieth of a grain, prepared by Mr. Morson, endangering the life of an individual. According to Dr. Pereira, it produces contraction of the pupil, when applied in a minute portion mixed with lard to the eye. According to Geiger and Hesse, dilatation of the pupil is the consequence. When a small quantity, either made into an ointment, or dissolved in alcohol, is rubbed for a minute or two on the skin, a sensation of heat and prickling is experienced, to which succeeds one of numbness and constriction in the part, which lasts from two or three to twelve or more hours, according to the quantity rubbed in. So small a portion as the hundredth part of a grain has produced a sensation, which has continued a whole day. Turnbull found, that unless these peculiar impressions were caused by the aconitia, no benefit whatever was to be expected from it; and he observes, that if there be the slightest abrasion of the skin, an application of such activity should not be resorted to, and that it should be carefully kept from coming in contact with any of the mucous membranes. The diseases in which it has been chiefly used are of the neuralgic kind; and gouty and rheumatic cases. It is applied either in *solution in alcohol,* in the proportion of a grain or more to the drachm; or of *ointment* made by rubbing two grains of aconitia with six drops of alcohol, and mixing this well with one drachm of lard. A small portion of this may be rubbed on the affected part, until either the pain is relieved, or the peculiar sensation described above is induced. The application may be repeated three or four times a day if requisite. (See the author's *New Remedies,* 3d edit. p. 33, Philada. 1841.)

Aconitia has nearly gone out of use. The extravagance of the price, in England—3*s.* 6*d.* or upwards of three quarters of a dollar per grain,—would, indeed, have limited its use, had it been more advantageous than it has proved to be. It would appear, indeed, that all its powers are possessed by the tincture of aconite, or by the alcoholic extract.

A spurious aconitia—according to Pereira—is found in the shops, which is imported from France, and bears the stamp and label of a celebrated French chemical firm. Its colour is grayish yellow, and it is said to be inert, or nearly so.

8. LACTUCA'RIUM.

Lactucarium is the inspissated juice of *Lactu'ca sati'va,* or *Lettuce;* Sex. Syst. Syngenesia Polygamia Æqualis. Nat. Ord. Compositæ—a plant whose native country is unknown; but which is supposed to be indigenous in the East Indies, and is cultivated in every part of the civilized world. Before the flower-stem shoots up, the plant abounds with a bland milky juice; and afterwards with one that is intensely bitter and milky. When incisions are made in the flowering stem, the juice exudes, and, when collected and dried, it constitutes the Lactucarium, *Thri'dacē* or *Lettuce opium.* The ancients were well acquainted with the soporific virtues of the common garden lettuce; but Dr.

J. R. Coxe, of Philadelphia, appears to have first proposed the employment of the inspissated juice in medicine.

There are three kinds of lactucarium. The *first*, and the best and most costly is obtained from incisions made in the stalks as mentioned above, whence the juice exudes, which is dried in the air. This preparation has a bitter taste; soon becomes of a brown colour, and solid; and has a gummy fracture, but absorbs moisture from the air, becoming soft and clammy.

The *second* is obtained by expression of the selected stalks, and subsequent evaporation, either in the air, or by artificial warmth. This is said to be the variety most commonly met with on the European continent. The *third* is prepared in the same manner as any common extract from every part of the plant. This is the *Thridace* of some. The first is the only one worthy the attention of the therapeutist. (See the author's *New Remedies*, 4th edit. p. 325. Lond. 1842.) Lactucarium has been several times subjected to analysis; but with no advantage to pharmacology. Neither morphia nor narcotia has been found in it.

The results of the author's experience in regard to the medical properties of lactucarium have been negative. They certainly do not enable him to say, that it is possessed of the sedative and hypnotic powers that have been assigned to it. By many, it is conceived to be adapted for cases in which opium disagrees, and especially for allaying the cough of phthisis, and other pulmonary affections. Being devoid of any exciting property, it has been given unhesitatingly when the patient was, at the same time, labouring under increased vascular action.

The usual dose is from gr. iij to gr. v: but it has been given to the extent of several drachms a day, without any very marked effect. There can be no doubt, indeed, that its virtues have been greatly exaggerated. As in the case of every anodyne and hypnotic, the dose should be increased until the desired effect is induced. It has been applied externally in conjunctivitis, in the quantity of four grains to the ounce; and, like other narcotics, has been formed into a plaster.

The LACTUCA VIROSA, or *strong-scented Lettuce*, of Europe, possesses properties analogous to those of the L. sativa; as well as the L. SCARIOLA. It is affirmed, indeed, that the former yields a much larger quantity of lactucarium, and of superior quality. The LACTUCA ELONGATA or *Wild Lettuce*, which is common in this country was originally introduced into the secondary list of the Pharmacopœia of the United States, as a substitute for the lactuca virosa of Europe. The extract prepared from it is said to be anodyne and hypnotic, in the dose of gr. v. to gr. xv.

9. HU'MULUS.—HOPS.

Hops are the strobiles of *Hu'mulus Lu'pulus,* the *Hop plant;* Sex. Syst. Diœcia Pentandria. Nat. Ord. Urticaceæ, which is indigenous in the United States, and in Europe, and flowers from June to August. It is extensively cultivated in this country, and chiefly in New England. The cones or strobiles constitute the hops of commerce, which are gathered in England in September, and dried in kilns. They have a peculiar smell, and an aromatic, intensely bitter taste,—the aroma being lost in process of time; but the bitterness continuing. The bitter taste, and the aroma reside chiefly in the lupulinic glands or grains, the **LUPULINA** or **LUPULIN** of the Pharmacopœia of the United States, which forms about a sixth part of the weight of dried hops, and may be separated by thrashing, and to which Dr. Ives considers, that the hops are indebted for all their medicinal virtue. These grains are of a cellular texture, and golden yellow colour. Unless carefully dried, they soon lose their taste and smell, and the aroma is always impaired by keeping.

Lupulin, on chemical analysis, yields about 2 per cent. of volatile oil of hops; upwards of 10 per cent. of bitter principle of hops, *Lupulite,* and 50 to 55 per cent. of resin. The scales afford but very little lupulin. Both they and the lupulin yield their virtues to water; but still better to alcohol—pure or diluted.

The emanations from hops are generally considered to possess hypnotic properties; hence a hop pillow is sometimes used to invite sleep. It was directed in the case of George the Third, of England, when he was affected with insanity; and came, on that account, much into use. Dr. Pereira states, that he has several times seen a pillow of hops promote sleep; but the author has not been able to arrive at this inference. He has often directed it, and sleep occasionally supervened; but he has not been able to decide that it was not induced, either in consequence of the effect on the mind of the imagination, or independently of the hops. The different preparations of hops and of lupulin are certainly most unsatisfactory narcotics, and by no means to be depended upon. Their bitter principle renders them valuable tonics; and hence their use in ale and beer, as well to communicate a pleasant aromatic flavour, as to check the acetous fermentation. Beer is accordingly prescribed as a tonic and nutritive drink in many cases.

INFU'SUM HU'MULI, INFUSION OF HOPS. (*Humul.* ℥ss; *Aquæ bullient.* Oj.) The dose of this *hop tea,* which is rarely used, however, is f. ℥j. to f. ℥ij.

TINCTURA HU'MULI, TINCTURE OF HOPS. (*Humul.* ℥v; *Alcohol. dilut.* Oij.) This preparation has been proposed as a substitute for laudanum when the latter disagrees, and the condition of disease, to which it has been considered best adapted, is the wakefulness attended with tremors and general nervous derangement, to which habitual drunkards are liable, and which frequently precedes an attack of delirium tremens. The dose is from f. ʒss. to f. ʒiij.

LUPULI'NA.—LUPULIN.

Lupulin may be given in the same cases as hops, in the dose of gr. vj. to gr. xij., made into pills by being rubbed in a warm mortar until they acquire the proper consistence.

TINCTU'RA LUPULI'NÆ, TINCTURE OF LUPULIN. (*Lupulin.* ℥iv; *Alcohol.* Oij.) The dose of this preparation is f. ʒj. or f. ʒij., in sugared water, or any mucilaginous fluid.

Hops are also used externally in the way of fomentation, in painful affections of an internal or external character. A dry hop poultice is often applied in internal affections of the abdomen,—the hops being sewed up in a flannel bag, heated and placed over the pained part. An ointment has, also, been used in cancerous sores, composed of powdered hops and lard. Lupulin may be added to poultices, or formed into ointment, and be applied in the same cases.

10. SPIRITUS ÆTHERIS SULPHU'RICI COMPOSITUS.—COMPOUND SPIRIT OF SULPHURIC ETHER.

(*Æther. sulphuric.* Oss; *Alcohol.* Oj; *Ol. æther.* f. ʒiij.) This preparation, which is an imitation of one described by Hoffmann, and hence termed *Hoffmann's Anodyne Liquor*, or *Hoffmann's Mineral Anodyne Liquor*, is regarded by many—as its name imports—to be possessed, in moderate doses, of narcotic powers. In very large doses, like alcohol, it is unquestionably narcotic. Many persons have a high opinion of its anodyne properties, which they are disposed to refer to the oil of wine that enters into its composition. Others believe, that it possesses no other virtues than the ordinary sulphuric ether. Certain it is, that little dependence is placed upon it in cases where potent anodynes are indicated; and notwithstanding the authority that has been brought forward in its favour, the author is compelled to say—from the results of careful experiments instituted with it on the sound and the sick—that he has not noticed in it any anodyne or hypnotic virtue, except that which has been induced by the evanescent excitant action of the ethers in general. It is added, however, to other decided narcotics—as to laudanum,—its action preventing the nausea, which occasionally supervenes on the use of the latter.

The dose of the spirit is f. ʒss. to f. ʒij, in sugar and water.

Besides the preceding narcotics, the following are officinal in the secondary list of the Pharmacopœia of the United States.

11. Ascle'pias Syr'iaca, *Common Silkweed, Milkweed;* Sex. Syst. Pentandria Digynia; Nat. Ord. Asclepiadaceæ, is a very common plant in this country; flowering in July and August. The root is officinal, and is said to possess anodyne properties. The dose of the powder is ʒj. in divided doses given through the day. It has, likewise, been administered in strong infusion. The author has had no experience with it.

12. Ly'copus, *Bugleweed, Ly'copus Virgin'icus;* Sex. Syst. Diandria Monogynia; Nat. Ord. Labiatæ, is an indigenous herb, met with in the greater part of the United States; flowering in August. The whole herb is officinal. Its odour is peculiar, and taste slightly bitter and nauseous. It readily yields its virtues to water.

Bugleweed is said to be a mild narcotic; allaying irritation and cough; and diminishing the activity of the circulation. It is given in *infusion,* (*Lycop.* ℥j; *Aquæ bullient.* Oj. Dose, f. ℥ss. to f. ℥iij.) but—like a multitude of other agents—its virtues are scarcely sufficient perhaps to warrant its retention in the lists of the materia medica.

III. TETANICS.

Definition—Modus operandi—Therapeutical application—Special Tetanics.

Between the agents described under the head of Narcotics, and those that fall under consideration here, there is a well-marked difference; for whilst the former are anodyne and hypnotic in appropriate doses, the latter—leaving the encephalon untouched—may affect most prominently the nerves of voluntary motion; giving rise to tetanic convulsions, especially in parts which are affected with paralysis; and only in excessive doses induce the ordinary signs of acro-narcotic poisoning. It is in consequence of this effect upon the nerves that are distributed to the muscles, or to the portions of the nervous centres with which they are connected, that this class of agents has been termed by recent writers, (*Pereira*, *Prof. Paine*, of New York,) TETANICS; and, to avoid confusion, the author has adopted it rather than attempt to suggest another appellation, and perhaps one that would not be more expressive. Dr. Pereira has called them also CONVULSIVES, and has defined them to be—"agents which augment the irritability of the muscular fibre, and in large doses occasion convulsions;" but their action seems manifestly to be exerted upon the nerves, and through them on the muscular irritability. The fact, indeed, that they induce involuntary muscular contractions of the voluntary muscles, from slight twitchings to the rigidity of tetanus, according to the quantity given, is sufficient to demonstrate, that the phenomena, resulting from their administration, are purely nervous.

They are chiefly given in paralysis, and especially in the local forms;—none of them being well adapted for cases in which the cause of the paralysis is encephalic.

SPECIAL TETANICS.

1. NUX VOM'ICA.

Nux vomica is the seed of *Strychnos Nux Vomica;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Apocynaceæ, (*Lindley*,) a middling-sized tree, which is indigenous in Coromandel, and other parts of India, and in Ceylon.

The wood—*Lignum Colubri'num*, or *snakewood*—is very bitter, and has been employed in the treatment of intermittents; and the bark was for a long time known under the name of *false Angustura* or *false Cusparia bark*, and was at one time referred to *Brucea ferruginea* or *antidysenterica.* The berry is round, smooth, of the size of a pretty large apple, and covered with a smooth, somewhat hard shell, of a rich orange colour, and filled, when ripe, with a white, soft gelatinous pulp, containing the seeds. These—as met with in the shops—are circular, and flat, nearly an inch in diameter; concave on one side; slightly convex on the other; and thickly covered with short, brown, satiny hairs. From their resemblance to buttons, the seeds have sometimes been termed *Bachelor's Buttons.* They are devoid of smell, but of an acrid, and very bitter taste.

The quantity of nux vomica, on which duty was paid in England, in 1840, was 550 lbs. (*Pereira.*) They are with difficulty divided finely. The simplest method is to rasp, or to soften them well with steam, and then slice, dry, and grind them. The powder is of a grayish-yellow colour, of a faint sweet odour, and an intense, durable bitter taste. (*Christison.*)

Alcohol is the best solvent; but dilute alcohol and water take up the bitter active constituents. They have frequently been subjected to analysis, but the results, obtained by Pelletier and Caventou, are considered the most satisfactory. Those gentlemen found them to contain,—strychnic or igasuric acid; strychnia and brucia, in combination with strychnic acid; wax, in small quantity; concrete oil; yellow colouring matter; gum; a little starch; bassorin, and woody fibre. Carbonate of lime, and chloride of potassium, were found in the ashes.

Nux vomica possesses the power of exciting the spinal marrow without implicating, otherwise than indirectly, the functions of the brain. The chief diseases in which it is administered, as well as its varied effects in accordance with the dose, may be considered under the head of its active principle, STRYCHNIA, with which—in a therapeutical point of view—it may be esteemed identical. It may be given in powder, in the dose of five grains, repeated three or four times a day, and gradually increased until the special effects of strychnia on the muscles are perceptible. The greatest objection to this form is its uncertainty, and hence the **ALCOHOLIC EXTRACT** has been generally substituted. This is prepared by taking any quantity of nux vomica rasped; exhausting it by repeated maceration in alcohol of .817, and evaporating it slowly to the consistence of an extract. When this extract is given in an over-dose, it occasions tetanic convulsions and death; and, in medicinal doses, in cases of paralysis, tetanic convulsions and a feeling of creeping are experienced, which indicate the action of the remedy.

Occasionally, it would seem to accumulate in the system, and afterwards to explode; death, at times, supervening with distressing cerebro-spinal phenomena; hence it is not always proper in encephalic paralysis. It is, however, in paralysis, general and local, that it is most frequently administered; indeed, in all the cases in which its active principle—strychnia—is given.

The dose of the extract—made into a pill—is one grain, the dose being gradually augmented, until the peculiar effects are induced. It may be taken at bed-time, as night affords the best opportunity for noticing the tetanic phenomena. Generally, from four to six grains are sufficient; but, at times, it is necessary to carry the dose to twenty or thirty grains. Should the administration of the remedy have been interrupted, the patient ought to recommence with the small doses, and increase them gradually as before.

It is sometimes given in TINCTURE—three grains of the *extract* being dissolved in an ounce of *alcohol* at .837. It is given by drops in cases in which the alcoholic extract itself is suggested: M. Pétrequin also employs a tincture of nux vomica, prepared of four ounces of the *powder* and a quart of *brandy*, which is used altogether externally as an embrocation to palsied parts. A **LINIMENT** is not unfrequently prescribed in similar cases, composed of an ounce of the *Tincture of Nux Vomica*, and two drachms of *Liquor Ammoniæ.*

a. STRYCHNIA.

This alkaloid was discovered in 1818 by MM. Pelletier and Caventou. It has been found in *Strychnos Nux vom'ica, S. Igna'tia, S. Colubri'na,* and *S. Tieut'é;* is often associated with brucia, and always with an acid. In the Pharmacopœia of the United States (1842) it is directed to be prepared by a process of which the following is the rationale. *Nux vomica,* rasped, is digested and boiled in two gallons of *water,* acidulated with *muriatic acid;* this decomposes the strychnate of strychnia as it exists in nux vomica, and a muriate of strychnia is formed. The residuum is boiled again and again in *acidulated water,* and the decoctions, after being strained, are mixed and evaporated to the consistence of syrup. *Lime,* previously mixed with water, is now added, and the mixture is boiled for a little while, frequently stirring. This decomposes the muriate of strychnia, and the powder which is precipitated, is pressed, dried and powdered. This powder is now treated repeatedly with *boiling alcohol,* until deprived of its bitterness; the liquors are mixed, and the alcohol is distilled off. The residue is mixed with *water,* heat applied, and sufficient *diluted sulphuric acid* added to neutralize and dissolve the strychnia; purified *animal charcoal* is now added to deprive it of its colouring matter; it is then boiled for a few minutes, filtered and crystallized. The sulphate of strychnia, thus formed, is dissolved in *water,* and sufficient *solution of ammonia* added to separate and precipitate the strychnia, which is dried on bibulous paper.

Thus obtained, strychnia is a white powder, of an intensely bitter taste, almost insoluble in water; slightly soluble in cold alcohol and readily soluble in the same menstruum when boiling. Although almost insoluble in water, it has a powerful bitter taste. A solution made in the cold, and therefore containing only $\frac{1}{6000}$th part of its weight, may be diluted one hundred times, and still retain a very decidedly bitter taste. It has an alkaline reaction, and forms, with acids, salts that are mostly crystallizable, and insupportably bitter, and are more soluble than pure strychnia.

The action of strychnia is precisely like that of nux vomica, for which it is now pretty generally substituted. In adequate doses, it is one of our most energetic poisons, producing death through its lethiferous action on the spinal marrow. A case of this kind, detailed by Dr. Blumhardt, of Stuttgart, is given by the author at length in another work. (*New Remedies*, 3d edition, p. 451, Philada. 1841.) Morphia appears to be the best antidote to its effects.

It is in paralysis that strychnia has been most prescribed; and from the results of numerous observations, it would seem, that it is most efficacious in paraplegia; less so in hemiplegia, although it has been given, at times, with advantage in the latter affection. Its administration in hemiplegia requires, however, special circumspection, particularly when the paralysis has succeeded to apoplexy; as there has been reason to believe, that the excitant influence of strychnia has had some effect in inducing a recurrence of the apoplexy. It is in local paralysis, that it is most serviceable—as in aphonia, amaurosis, paralysis of the bladder, and rectum, of the facial nerve, &c. In high degrees of paraplegia, the internal use of the remedy is sometimes preferred; but the endermic administration is more general. In paralysis of the limbs, a spot is selected in the vicinity of the spinal marrow. Strychnia has, likewise, been given in neuralgia, traumatic tetanus, hysteria, hypochondriasis, dyspepsia, chorea, epilepsy, and catalepsy; but the author has never seen any advantage from it in these affections. It has been administered, likewise, in dysentery and diarrhœa, and has been used endermically as well as internally in cholera, in which it was frequently prescribed to allay vomiting—from a quarter to half a grain being added to three ounces of water, and given in the dose of a spoonful every hour. A modern writer (*Ryan*) asserts, that he has repeatedly known a few of the following pills check a profuse diarrhœa with rice-coloured evacuations, even when the extremities were blue, in malignant cholera. (*Strychniæ*, gr. i; *Confect. Ros.* ʒss; *Pulv. Glycyrrhiz.* ℈ss.—M. et divide in pil. xii. Dose, one, night and morning, gradually increased to four or five daily.) From its occasional efficacy in analogous conditions of the digestive mucous membrane, it has been suggested, that it might prove useful in bronchitis.

Strychnia is best given in the form of pill or tincture. The dose is from $\frac{1}{16}$th to $\frac{1}{8}$th of a grain, which may be gradually increased until a grain is taken, or until its peculiar effects upon the muscles are apparent. Should these be too severe, they may be moderated by a dose of opium or morphia. A TINCTURE may be made of *Strychnia*, gr. iij; *Alcohol*, ℥i; the dose of which is from six to twenty-four drops, twice or thrice a day.

In the endermic application of the remedy, a blister of the requisite size is applied, and a quarter of a grain is sprinkled twice a day on the denuded surface; the quantity being slowly increased to half a grain or more, should this be necessary. When used endermically, the preparations of strychnia produce much more powerful local effects than those of morphia; they are apt to keep the abraded portions of the skin in an inflamed state, promote suppuration more than morphia, and occasion violent itching and burning, with a feeling as if needles were run into the skin.

When strychnia, administered in larger doses, does not act beneficially in any case, it will be advisable to discontinue the remedy for a few days—after which smaller doses may again exert their influence—rather than to carry the dose still higher. At times, during its endermic use, the blistered surface becomes covered with a layer of coagulable lymph, in consequence of which the strychnia does not make its appropriate impression. This layer must be removed, as far as practicable, at each application; and as the vesicated surface becomes daily less and less sensible, the dose must be proportionately increased.

Besides strychnia, several of its salts are occasionally used in medicine; for example, the ACETATE, the IODATE, and the NITRATE. They are given in the same cases as strychnia itself. (*New Remedies*, p. 459.)

b. BRUCIA.

From the Nux Vomica Bark an alkaloid is obtained analogous to strychnia. It is also associated with strychnia in the seeds of nux vomica, and in St. Ignatius' bean, and is combined with igasuric acid. In the bark of nux vomica, however, it is combined with gallic acid. In the preparation of it, an *alcoholic extract* of false angustura bark is first made, which is dissolved in a large quantity of cold water, and filtered to separate the fatty matter. The colouring matter is precipitated by acetate of lead, the excess of which is thrown down by sulphuretted hydrogen gas, and the brucia by an alkaline base, for which purpose magnesia may be employed. The precipitate from the magnesia is then washed, dried, and treated with alcohol, which lays hold of the brucia. This is obtained by evaporation.

Pure brucia is of a white colour, and in crystals, which have the form of oblique four-sided prisms. Its taste is very bitter, and it is soluble in 500 parts of boiling water, and in 850 parts of cold. It dissolves readily in alcohol. With the acids it forms neutral salts.

Brucia acts on the economy like nux vomica bark, but much more energetically. It is analogous to strychnia in its operation, but much weaker,—in the ratio of 1 to 10 according to Pelletier, of 1 to 12 according to Magendie, and of 1 to 24 according to Andral. It is scarcely ever used, however. It may be given in pills or in tincture. (See the author's *New Remedies*, p. 102.)

2. AR'NICA.—LEOPARD'S BANE.

Arnica—the root and herb of *Ar'nica montana;* Sex. Syst. Syngenesia Polygamia superflua; Nat. Ord. Compositæ, is in the secondary list of the Pharmacopœia of the United States. It is common in the Alps, and is met with also in the mountainous parts of the north of Europe. It is said, also, to be found in the northern regions of this continent to the west of the Mississippi. (*Nuttall.*) The whole plant, and especially the root, possesses a peculiar aromatic unpleasant odour, and an acrid nauseous taste. The root yields, on analysis, volatile oil, acrid resin, gum, extractive, and woody fibre, (*Pfaff*); and Dr. A. T. Thomson is of opinion, that the igasurate of strychnia exists in the plant.

Arnica, in large doses, belongs to the class of acro-narcotic poisons. In smaller doses, it has been employed, especially in Germany, in paralysis as an excitant to the nervous system. In this country, however, it is not much used, and there does not appear to be any clear appreciation of the affections for which it is adapted. (*Wood & Bache.*) Such seems to be the case with the French practitioners. "It may be concluded,"—say MM. Mérat and De Lens,—"that we have as yet insufficient data to pronounce positively on the affections in which the arnica can be unequivocally efficacious; we must consequently always bear in mind its heating and active qualities when we prescribe it."

Of late, the *volatile oil of the flowers* has been much prescribed in Germany, in old cases of paralysis, the result of the apoplectic condition. Schneider mixes four drops of *arnica oil* with half an ounce of *Hoffmann's anodyne liquor* or *spirit of nitric ether;* and of this he gives from four to twelve drops several times a day.

3. TOXICODEN'DRON.—POISON OAK.

The leaves of *Rhus Toxicoden'dron;* Sex. Syst. Pentandria Trigynia; Nat. Ord. Terebinthaceæ, are in the secondary list of the Pharmacopœia of the United States. *Rhus Toxicoden'dron* and *Rhus radi'cans* or *Poison vine,* are mere varieties of the same plant. The Poison Oak is a shrub from one to three feet in height. It is very common in the United States from Georgia to Canada, flowering in June and July. The juice, which issues from it when wounded, excites erythematous inflammation and vesication when applied to the skin, sometimes putting on the characters of ordinary local erysipelas; at others, of herpes. Nor does it seem to be necessary that the juice of the plant should come in contact with these plants to produce this effect. An acrid volatile principle appears to escape from them, which causes the mischief. This generally appears soon after exposure, and generally declines in about a week.

The leaves, when taken internally in large doses, are acro-narcotic. In medicine, their use has been almost restricted to old paralytic cases dependent upon torpor of the nerves,—the same cases as require the use of strychnia,—but they are not much prescribed.

The dose, usually given, has been from gr. ss. to gr. j.; but much larger quantities may be prescribed without inducing its disagreeable excitant effects on the nerves. It is said to induce twitchings of the affected muscles like strychnia.

6. ANTISPASMODICS.

Definition of antispasmodics—Spasm considered—No direct antispasmodic—Modus operandi of the indirect mental antispasmodics—Therapeutical application of antispasmodics, in tetanus, chorea, epilepsy, asthma, hooping-cough, colic, hysteria, &c.—Special antispasmodics.

Great discrepancy has existed among therapeutical writers as to the precise situation in which antispasmodics ought to be placed. Murray classes them, with narcotics, amongst the "diffusible stimulants;" whilst Thomson places them with these same agents,—as substances that diminish action secondarily. A short inquiry may tend to place them in their proper position. They are usually defined;—"substances that allay irregular muscular contraction," and Dr. Paris affirms, that there are certain medicinal bodies, which would appear to exert a specific control over spasmodic action, from whatever cause it may have originated: such, he says, are assafetida, galbanum, musk, castor, ammonia, valerian, &c. He properly adds, however, that "in a more general view of the subject, we must admit, that this class branches, by indefinable gradation, into narcotics and tonics; for since spasm may be connected with the most opposite states of the body, it is very evident, that many of the individuals included in the class of antispasmodics can only be relative agents: spasm, for instance, may arise from excessive irritability, as from teething, wounds, worms, &c., in which case a narcotic would prove beneficial; or it may depend upon a state of general debility, the proper remedy for which would be the administration of an aromatic stimulant, or the assiduous exhibition of some permanent tonic."—It may be affirmed, however, that we are not acquainted with a single article of the materia medica, which acts specifically on the muscular fibre when in a state of spasmodic contraction. That such *may* exist cannot be denied, but at this time we know of none. They may all be regarded as *indirect* agents; relieving and removing spasmodic action, in consequence of their agency being exerted on other parts of the nervous system than those concerned in the irregular muscular contraction, and thus deriving from the nervous influence concerned in the production of the latter.

In order to thoroughly comprehend this position, it is proper to inquire into the nature of spasm. The Greeks gave the name to every kind of convulsion; and, by modern nosologists, convulsions are ranked amongst the '*spasmi.*' The term is now usually applied, however, to involuntary contractions, especially of the voluntary muscles; and these, again, have been divided into *tonic* spasms, when they consist in permanent rigidity of the muscles concerned, of which we have an example in common cramp;—and *clonic* spasms, which consist in alternate contractions and relaxations—of which we have an example in the convulsions of children.

It is now admitted by almost all physiologists, that the muscular fibre, like every primary tissue of the body, is possessed of excitability or irritability,—that is, of a power of being acted upon by appropriate stimuli, and of moving responsive to such stimuli. This *vis insita,* however, absolutely requires that it shall be acted upon by stimuli before motion is perceptible. The muscular filaments of the voluntary muscles are supplied with nerves from some part of the cerebro-spinal axis, and along these nerves the appropriate stimulus is sent which rouses them to contraction. In the case of voluntary motion—as of the biceps to raise any weight attached to the hand, or to the extremity of the forearm—an act of volition is executed, under the influence of which the portion of the cerebro-spinal axis, whence the nerves proceed to the upper extremity, is excited to send the proper nervous influx along those nerves, in quantities strictly in accordance with the extent of action, which the muscle should execute. The muscle immediately contracts responsive to the stimulation. Now, if any cause of irritation exist in the cerebro-spinal axis, or indeed in any part of a nerve distributed to a muscle, such irritation may induce the same effect as the act of volition, and the muscle may, in this manner, be permanently or intermittently contracted. In all cases, therefore, spasm appears to be a nervous phenomenon, and remedies adapted for its removal, must exert their agency on some part of the nervous system—not on the muscular fibres, over the condition of which they would not appear to have the slightest control.

They, who admit *direct* antispasmodics, find, that difficulties environ them, the very nature of which entangles the subject in inextricable confusion. A late writer on therapeutics, (*A. T. Thomson,*) after entering into a long and singularly infelicitous disquisition on the precise *modus operandi* of antispasmodics—suggests, as a point requiring consideration,—whether they are stimulants or sedatives? and he decides, that they are sedatives; "for," he remarks, "if the irregular or inordinate action, which they overcome, be the consequence of irritation, either mental or corporeal, it follows that, in resolving spasm, the susceptibility of impression in the extreme motor nerves must be diminished; and this can only be the result of a sedative power. It may, however, be affirmed, that this must either be immediate or consecutive of a previous stimulant operation; thence we can explain the reason, why some of those medicines, which can only be regarded as direct antispasmodics, stimulate the general system, and, consequently, quicken the pulse; since, like narcotics, this action may be primarily of a stimulant character, and be quickly followed by collapse. According to this mode of reasoning, the same results may follow from antispasmodics operating exclusively on the motor nerves, as from narcotics operating on those of sensation."

Without animadverting on many of the hypothetical positions contained in this extract as to the *modus operandi* of antispasmodics, and the parts on which they specially act, it may be observed, that every difficulty vanishes when we regard the *direct*—for such only can be esteemed *true* antispasmodics, as acting only by virtue of the new impression which they make on the gustatory or gastric nerves, or both, and thus deriving from the inordinate action going on in some other portion of the nervous system. What, indeed, are the reputed direct antispasmodics?—musk,—castor,—Dippel's oil,—oil of amber,—valerian,—assafetida,— galbanum,— skunk-cabbage,— ethers, &c.;—all substances belonging to the class of excitants, and many of them calculated, in addition, to make a powerful impression on the nerves of gustation and olfaction: and what, again, are the *indirect* antispasmodics? Dr. Thomson divides them into *material,* including tonics and narcotics; and *mental,* comprising, fear and abstraction. It is strange, however, that he should not have classed blood-letting amongst the material agents, especially as he had previously remarked, with much propriety, that, whether the effects of antispasmodics be perceptible very soon after their administration must necessarily depend on the cause of the spasm, "whether it arise from exhaustion and collapse; such, for example, as occurs from blood-letting when the quantity of the vital fluid abstracted is more than the condition of the system can support, in which case nothing is more common than for syncope to be attended with convulsions; or whether it depend on the opposite state, fulness of the vessels of the brain, sufficient to produce epilepsy, or on some degree of inflammation, as in phrenitis, which is sometimes also attended with convulsions." "It should ever be remembered," he adds, "that although antispasmodics are indicated, and proper in the first state, just described, yet, that this class of medicines is positively injurious, when the spasmodic action is the consequence of inflammation of the brain or spinal marrow, or their coverings: under such circumstances, blood-letting and measures calculated to subdue the primary disease are the means to be adopted." One of the great difficulties, indeed, in discriminating the character of different diseases of the convulsive kind, is involved in the consideration, whether they be dependent upon an inflammatory or congestive condition of vessels, or connected with exhaustion, or excessive irritability of the nervous system. In another section, however, the author has dwelt on everything applicable to this portion of the subject, when considering the effects of the abstraction of blood in such diseases. To that section he must refer the reader. (See SEDATIVES.)

In ordinary cases of spasmodic action, not dependant upon any excited action of vessels, anything that produces a new nervous impression proves antispasmodic. Narcotics do so by blunting the impressibility of the whole nervous system. Nauseous agents produce their effects upon the olfactory or gustatory nerves; and, if they be excitants at the same time, upon the nerves of the stomach. Simple excitants and tonics act on the same nerves, and through them on the general system. Nothing, indeed, could better elucidate the *modus operandi* of these agents, than those, which Dr. Thomson has termed MENTAL NARCOTICS—*Fear* and *Abstraction*. He refers to a striking instance of the sanative effect of fear in hooping-cough kept up by habit. The patient, a young boy, was threatened with the application of a large blister, and although it was not applied, but merely placed within his view, the dread of it completely relieved the cough. Boerhaave is asserted to have cured epilepsy, by taking a red hot poker, at the moment of the expected attack, and threatening to push it down the throat if the patient should have a fit. Still more recently, the same remedy has been advised to be directed towards the nether extremity of the body. In a treatise on plague, dysentery, and ophthalmia, Dr. Louis Frank recommends, that a dysenteric patient should be tied hand and foot, and be held by two men, when—"*chirurgus cum ferro candenti, figuram coni habenti, coram ægroto compareret, et id versus anum dirigeret, quasi id ano intrudere vellet.*"!

All these are cases of the simple revulsive effect of fear, and in this way any mental emotion may prove antispasmodic. Any form indeed, of abstraction, or rather of distraction, is necessarily revellent, and antispasmodic. When Cato, the Censor, reduced luxations, as he pretended, by certain mystic words, (p. 51,) he diverted the attention of the sufferer, prevented inordinate contraction of the muscles around the dislocated joint, and a slight manipulation only was necessary to reduce it. At the present day, the surgeon is in the habit of employing this agency, and although he may have no faith in set forms of speech, or in cabalistic expressions, he knows, that if he can concentrate the attention of the patient, he may lessen the contraction of the implicated muscles, by diverting, in some measure, the nervous influx from them; and if he then suddenly exerts his skill at reduction, the bone occasionally slips readily into its place.

The same kind of revellent influence is invoked in cases of cramp. In the "Table Talk," of Coleridge, there is an allusion to one of the popular charms for cramp, of which there are so many. "When I was a little boy at the Blue-coat School, there was a charm for one's foot when asleep; and I believe it had been in the school since its foundation in the time of Edward the Sixth. The march of intellect has probably now exploded it. It ran thus:—

Foot! foot! foot! is fast asleep!
Thumb! thumb! thumb! in spittle we steep;
Crosses three we make to ease us,
Two for the thieves, and one for Christ Jesus.

And the same charm served for a cramp in the leg, with the following substitution:—

The devil is tying a knot in my leg!
Mark, Luke and John, unloose it, I beg!
Crosses three," &c.

("*Table Talk*," ii. 33.—American Edit.)

Partly by an analogous agency, the animal magnetizer operates his cures, and change of air, society, and scenery exert their good effects in nervous maladies. Some years ago the author visited a gentleman who had suffered for some hours under such excruciating pains in the bowels as to induce him to believe that he was labouring under enteritis. As soon as the author had examined into his case, and laughed at his fears,—under the new mental condition induced—the colicky spasms rapidly yielded, and in half an hour he was well. Certain highly nervous and imaginative persons can feel pains wherever they please, and many an individual, by the perusal of cases of disease, has fancied himself affected with the same sufferings which he has seen depicted.

If, therefore, attention can direct the nervous afflux *to* a part, it is obviously of great moment so to impress the nervous system of the individual, that no concentration of the kind may take place towards the suffering organ; and this may be accomplished by engaging the mind on some subject of entertainment or reflection, or by impressing the totality of the nervous system, or, by affecting nerves at a distance from those implicated.

The author has before observed, that he does not regard the direct or true antispasmodics, as they have been termed, to be worthy of the name—and that he believes them to produce their effect by the impression they make on the nerves of two of the senses, and by their stimulant properties, which,—in the case of the articles referred to, as *true* antispasmodics,—are dependent upon animal resin, empyreumatic oil, volatile oil, or gum-resin. It has been affirmed, however, that this view is negatived by the fact, that assafetida—and the remark applies to other articles on the list—relieves hysteria, even when injected into the rectum, and when, of course, there can be no impression made on either the gustatory or olfactory nerves. This is true; but the whole effect appears in such case to be produced by the excitant properties of the gum-resin; and that this is the case is demonstrated by the fact, that if we throw up an excitant—which may never have been regarded as an antispasmodic—we produce the like result. By either agent, a new impression is made on the nerves of the rectum, which at times, rouses the individual to consciousness. In such cases, the author is in the habit of administering an enema of oil of turpentine, not, however, because he regards it as possessing any virtues over the excitant oils in general;—or as entitled in any respect to the appellation of a direct or true antispasmodic.

Therapeutical Application of Antispasmodics.

To exhibit what little confidence is reposed in true antispasmodics, by practitioners in general—even by those who consider that such a class really exists—it is well to glance generally but briefly at the different antispasmodics—direct and indirect—that are employed in affections of the nervous system, and are regarded by all as eminently adapted for them;—an inquiry which will signally exhibit how much more the latter class are relied on, when much disease is present, than the former. There is, indeed, but one morbid condition, in which *direct antispasmodics* are largely employed at the present day, and the rationale of their action in it is sufficiently manifest.

Tetanus affords us an example of a tonic spasm, which would seem to be signally adapted to test their efficacy. The disease is seated in the great nervous centres, and unfortunately is too often totally irremediable. Rarely, however, do we find musk, or assafœtida, or castor, or any of the *direct* antispasmodics employed, because experience has exhibited their insufficiency. Trust is placed almost wholly in *indirect* agents, and especially in narcotics, of which opium is usually chosen; and it is astonishing what quantities can be borne without the induction of any signs of narcosis. Cases are on record in which fifteen or twenty grains have been given every three hours for several days in succession, and yet but little effect has been produced on the disease, or the patient. Under the excessive erethism of the nervous centres, which constitutes the pathology of tetanus, narcotics do not produce their ordinary results, and the same remark applies to cases of great exaltation in the action of the nervous centres, which characterizes many of the diseases belonging to the class *Neuroses.*

A case of tetanus algidus or tetanus from cold, already referred to, that fell under the author's care—may serve to illustrate the mode in which antispasmodics exert their agency. A young man, whilst heated, threw himself into a river to bathe. He immediately experienced some indisposition, and, in a few hours afterwards was attacked with tetanus, in the form of opisthotonos. He was put upon the use of narcotics, but without the disease yielding. He was now taken out of bed, placed in a brook that ran by the house, and pailful after pailful of cold water was thrown over him, whenever the spasms became violent. Soon after the adoption of this treatment the spasms yielded, and, by a continuance of it, they ultimately passed away. The boy wholly recovered. This remedy probably exerted its agency in the manner described as applicable to antispasmodics in general. It made a new impression on the nervous system by the shock that accompanied the affusion, and thus broke in upon the chain of morbid phenomena seated in the cerebro-spinal system.

Chorea is another disease in which the true antispasmodics might seem to be indicated, yet they are but rarely employed. The disease appears to depend usually upon great mobility of the nervous system,—chiefly of the part connected with the nerves distributed to the voluntary muscles,—united with diminished impressibility of the nerves of some other parts, as of the stomach and intestines: hence tonics and purgatives are chiefly relied on, and they become *indirect antispasmodics.*

Epilepsy is dependent upon so many causes, that its treatment has to be varied according to circumstances. In the majority of cases, however—as in every disease characterized by periodicity—a powerful impression made upon the nervous system will prevent a paroxysm; but the impression must be made immediately before it is expected. Except for the purpose of preventing a paroxysm, true antispasmodics cannot in any respect be relied on; but if a large dose of assafetida, castor, or musk were administered immediately before the hour at which a fit of epilepsy or of ague were expected, it might prevent it. It is in such cases that mental antispasmodics have been mainly employed. Any agent, indeed, that excites a new and powerful impression—any revellent—may be followed by the same results. Most commonly, epilepsy is attended by evidences of great impressibility and debility of the nervous system; and tonics—especially the metallic tonics—are chiefly relied on. It is probably altogether by exciting a new condition in the part to which it is applied, and by modifiying circulation and innervation, that a ligature, put around one of the extremities, will at times arrest a paroxysm of the disease.

Asthma, again, as elsewhere remarked, must be looked upon as a nervous disease—spasmodic in its character generally, that is, dependent upon erethism of the branches of the pneumogastric nerves distributed to the bronchial tubes,—but sometimes owing apparently to something like paralysis of the same nervous branches. Hence, different agents are effectual, according to the precise pathological condition. Commonly, however, narcotics are signally beneficial. Opium is given in large doses;—stramonium is smoked;—lobelia inflata is freely administered; galvanism is employed; and all these are occasionally eminently successful; but we rarely hear of the administration of *direct* antispasmodics, although from the suddenness of the attacks of the disease they might seem to be indicated, and might occasionally be useful. They are so completely eclipsed by the *indirect* agents of the class, that they are very rarely employed.

Hooping-cough, although a peculiar disease, is somewhat analogous in its pathology to the last. When Nasse bruised and pinched one of the pneumogastric nerves in a living animal, so as to break down the structure of the nerve, he found, that convulsive cough was excited, like that of hooping-cough. But, although this disease is so markedly convulsive as to have received the name '*bex convulsiva*,' and various others indicative of its character, none but indirect antispasmodics have received the confidence of the practitioner. Narcotics generally have been employed, and of these belladonna more frequently perhaps than any other; but scarcely ever, assafetida, musk, castor, or any of the *direct* agents belonging to the class.

In common *colic*, both direct and indirect antispasmodics may be at times advantageously used; and the same may be said of some forms of *gastrodynia*. When these are dependent upon causes, which gentle excitants are capable of obviating, a stimulating gum resin—like assafetida—may be employed with prospects of benefit. Hence it is serviceable in flatulencies, for the removal of which it is often had recourse to, in popular practice.

It is only in *hysteria*, however, that direct antispasmodics are, at this day, much used. The affection is cerebro-spinal, and the symptoms that indicate it are numerous and varied. There is scarcely a nerve or a ramification, however small, which does not occasionally seem to participate in the morbid condition. Generally, the nervous erethism is chiefly concentred in the cerebro-spinal axis, whence irradiations proceed to every part of the economy; and the object, which the practitioner has in view, is to divert the nervous action to some other portion of the frame. Hence, he administers substances that are as nauseous as possible, combined or not with excitants as he may think proper. With this view he prescribes assafetida, valerian, dracontium, and all the reputed *direct* antispasmodics, during the paroxysm; and in the interval adapts his remedial agent to the indications which may suggest themselves.

These few observations, on the use of antispasmodics in diseases in which they would appear to be signally appropriate, will exhibit the little reliance that can be placed upon such as are esteemed *direct* agents—the *antispasmodica vera;* and the author does not think he can better terminate the few remarks he has considered it expedient to make upon this class, than by quoting the conclusion at which a therapeutical writer often referred to, has arrived, after having occupied several pages of his work with the explanation of the *modus operandi* of direct antispasmodics. "From what has been said, it is evident that the range of this class of medicines (antispasmodics) is extremely limited; and, in fact, that every thing which the substances placed in it can effect, even as direct antispasmodics, may be accomplished by other orders of medicines—purgatives, diaphoretics, narcotics, and tonics. At best, antispasmodics can be regarded only as auxiliaries; and the spasm and convulsions are less to be considered than the causes which induce them: remove the cause, and the effect will cease." (*A. T. Thomson.*)

The author has been gratified to find, that the above views on the agency of antispasmodics, as contained in the first edition of his *General Therapeutics*, have been adopted, with due acknowledgments, by a recent writer on the subject (*Spillan*), and the whole article is translated in *La Lançette Française*, 7 Février, 1839.

SPECIAL ANTISPASMODICS.

I. *Excitant Antispasmodics.*

1. ASSAFŒTIDA.—ASSAFETIDA.

Assafetida is the concrete juice of *Fer'ula Assafœ'tida;* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ; which is indigenous in Persia, the mountains of Chorasan and Laar. It is probable, however, that assafetida is obtained from at least two species of plants. (*Christison.*) Seeds of the Chorasan plant, which were sent to London in 1839, would seem to have belonged to three species. It is obtained by making incisions into the upper part of the root; the foot-stalks of the leaves and the fibres at the top of the root having been previously removed. The juice is scraped off as it exudes. The process may be repeated as often as twelve times in the course of six weeks, before the root is altogether exhausted. The assafetida, gathered from several plants at one time, is united into masses of about one or two pounds in weight, and when farther hardened by keeping, is sent to the ports of Persia for exportation, or is consumed in the country as a condiment. With the Orientals, indeed, it is highly esteemed—being termed *Le manger des Dieux*, whilst, on the other hand, with us, it bears the undignified but expressive appellation of *Devil's dung*,—with the Germans, *Teufelsdreck.*

Assafetida is usually sent from the Persian Gulf to Bombay, whence it is exported to Europe. In 1839, the quantity on which duty was paid was twenty-four cwts. That which we receive in this country is either brought directly from India, or indirectly by the way of Great Britain. As met with in the shops, it is in irregular pieces of different sizes, varying generally from half a pound to two pounds and upwards in weight. The pieces have an irregular, amygdaloid appearance externally, as well as internally, appearing to be composed of irregular shaped tears, agglutinated by a softer substance. In the inferior kinds, the tears are few in number, and the agglutinating materials more copious. The best pieces are of a yellowish white colour externally; the inferior sorts of a brownish red hue. All the varieties have the peculiar alliaceous odour, by which it is so well known; and a strong, bitterish, somewhat acrid taste. By exposure to the air, it loses its most striking qualities, and is best preserved in bladders, or in some close space. Except in very cold weather, it cannot be reduced to powder, and then it is apt to cohere. When softened by heat, it may be forced through a cloth, and in this way be freed from its impurities.

Dr. Pereira describes three varieties. 1. *Assafetida* in the tear, which he suggests to be the concrete juice of *Ferula Persica;* 2. *Lump Assafetida*, the kind usually met with in the shops, the produce of *Ferula Assafœtida;* and 3. *Stony Assafetida*, which he has never met with in commerce, and which seems to contain 51.9 per cent. of gypsum.

Assafetida has been often subjected to analysis, and its main constituents have proved to be, 1. Volatile oil of assafetida, which, like the essential oils in general, is excitant, and possesses the odorous qualities of the gum-resin; 2. Resin of assafetida; and 3. Gum. Water, cold or warm, dissolves the gum, and the mucilage, thus formed, suspends the resin and volatile oil. Its virtues are yielded to alcohol, and when this is diluted with water, the hydrated resin is separated, and the fluid rendered milky.

Assafetida is the best example of what have been termed *direct antispasmodics.* It contains—as has been seen—a volatile oil of an extremely disagreeable character, but which is powerfully excitant, and makes a nauseous impression upon the gustatory nerves; and likewise resin, which is also excitant.

It is by virtue of these properties—as remarked of antispasmodics in general—that it is highly useful in diseases in which it is important to make a new nervous impression; hence its value in hysteria especially, and in certain cases of hypochondriasis. It is, likewise, used in chorea and in hooping-cough; but although much testimony has been adduced in its favour in the latter disease, the author has never seen it of marked advantage. Hooping-cough is a self-limited affection, and no remedies can be productive of much benefit except as palliatives; nor has assafetida, in the author's experience, effected this much. In old cases of catarrh, it has been of service, as elsewhere remarked, (p. 231.) as an expectorant. In like manner, its excitant properties render it well adapted for flatulent colic.

Perhaps in the whole class of phenomena, termed *nervous*, there is no article of the materia medica which is more employed, and none which is more satisfactory by reason of the powerful impression it makes on the special nerves of gustation, as well as on those of the stomach, and through them on the general system.

The average dose of assafetida is ten grains, which, as an antispasmodic, ought to be given in the liquid form, in order that all the effects of the remedy may be exerted. Its operation in this form is likewise more speedy. When given in enema—as it not unfrequently is, in torpid conditions of the bowels, as well as in the paroxysm of hysteria and other convulsive affections—from half a drachm to two drachms may be rubbed up with warm water.

MISTU'RA ASSAFŒ'TIDA, ASSAFETIDÆ MIXTURE, (p. 232.) The dose of this mixture, as an antispasmodic, is f. ℥ss. to f. ℥iss. It is often given in hysteria and other nervous affections.

PIL'ULÆ ASSAFŒ'TIDÆ, ASSAFETIDA PILLS. (*Assafœt.* ℥iss; *Saponis,* ℥ss. Make into 240 pills.) Each pill contains three grains of assafetida.

PIL'ULÆ ALOES ET ASSAFŒ'TIDÆ, PILLS OF ALOES AND ASSAFETIDA, (p. 171.) Adapted for nervous cases, which are accompanied with constipation.

TINCTU'RA ASSAFŒ'TIDÆ, TINCTURE OF ASSAFETIDA. (*Assafœtid.* ℥iv; *Alcohol.* Oij) This tincture possesses all the virtues of the assafetida, and may be given in the dose of f. ʒss. to f. ʒij. When water is added to it, it becomes milky, owing to the separation of hydrated resin; but the mixture is efficacious.

EMPLAS'TRUM ASSAFŒ'TIDÆ, ASSAFETIDA PLASTER. (*Assafœtid., Emplastr. plumbi,* āā ℔j; *Galban., Ceræ flavæ,* āā ℔ss; *Alcohol. dilut.* Oiij. The assafetida and galbanum are dissolved in the alcohol; the liquor is strained, and evaporated to the consistence of honey; the lead plaster and wax, previously melted, are then added, and evaporated so as to form a plaster.) This plaster is applied over the stomach or abdomen, in cases of flatulence, especially when accompanied by hysteria; and to the chest or between the shoulders, as an antispasmodic, in hooping-cough. It is exceedingly questionable, however, whether any of the virtues of the assafetida or galbanum be exerted in this manner; as simple rubefacient plasters appear to be of the same efficacy.

Assafetida is one of the ingredients of the *Pilulæ galbani compositæ* of the Pharmacopœia of the United States.

2. CASTO'REUM.—CASTOR.

This is a peculiar concrete substance from *Castor fiber,* the *Beaver;* order Rodentia; an inhabitant of northern Russia, and of the northern parts of North America. Castor is obtained from two follicles situate between the anus and external genitals of both sexes, which are filled with a thick fluid secretion, that slowly concretes after they are removed from the animal. They are generally dried either by smoke, or in the sun; and are frequently united by a part of the preputial membrane.

Almost all the castor of Europe is derived from North America, the Russian being so very rare as to be scarcely ever seen in Great Britain. (*Christison.*) Very little Russian castor reaches this country; that which is brought to Philadelphia being derived chiefly from Missouri. (*Wood & Bache.*) In the year 1839, duty was paid in England on 800 lbs.—the greater part being sold for exportation. (*Pereira.*)

The American castor of the shops is contained in sacs about two inches long; flattened and wrinkled; having the appearance of a pair of dried testicles united by their spermatic chord. It is of a dark liver-brown colour externally; of a lighter hue internally; of a resinous fracture; a strong, peculiar, disagreeable smell; and an aromatic, bitter, nauseous taste. Alcohol is its best solvent.

Russian castor is so scarce, that it brings a very high price. Dr. Pereira states, that he has paid for a museum sample £2 per ounce; whilst the American castor brought only twenty shillings a pound. One variety, the *chalky Russian castor*, effervesces when diluted chlorohydric acid is dropped upon it.

The analysis of castor has afforded, as main constituents—a volatile oil of castor; a peculiar substance, called *Castorine* or castoreum camphor, scarcely any of which can be obtained from American castor,—and resin, which has a slight odour of castor.

Castor is much less excitant, and less powerful as a nervine than assafetida. It is prescribed in the same diseases, however. The dose is from gr. x to gr. xx; but it is better given in tincture.

TINCTU'RA CASTO'REI, TINCTURE OF CASTOR. (*Castor.* cont. ℥ij; *Alcohol.* Oij.) The dose is from f. ʒss. to f. ʒij.

3. VALERIA'NA.—VALERIAN.

Officinal Valerian is the root of *Valeria'na officina'lis, officinal* or *great wild Valerian;* Sex. Syst. Triandria Monogynia; Nat. Ord. Valerianaceæ, which inhabits wet places, and sometimes dry banks in most parts of Europe, of which it is a native. The root is dug up in the autumn, when the leaves have decayed. It is sometimes, also, collected in the spring before the stem rises.

The rhizoma consists of a tuberous rootstalk forming a head, and of numerous long, slender, cylindrical fibres issuing from it. It has likewise portions of the stem attached. The colour of the root is externally yellowish or brown; internally, white: the odour is strong and characteristic, and although disagreeable to man, is quite the contrary to cats, which delight in rolling upon it. Its taste is warm, bitter, and nauseous. All its virtues are readily communicated to water, alcohol, and ammoniated alcohol, which are the menstrua employed in the officinal preparations. When subjected to analysis by Trommsdorff, it was found to contain volatile oil, which is its active constituent; valerianic acid, resin, and resinous extractive. The valerianic acid, it has been thought probable, is formed by the oxidation of the volatile oil.

Valerian, in large doses, is excitant to the nervous system, inducing headache, mental excitement, hallucinations, &c. Its action, however, in medicinal doses, is more like that of assafetida, and the other antispasmodics already considered; and it is prescribed in identical cases, especially in hysteria, and hysteroid affections.

The dose of the powder is from ʒss. to ʒiss. three or four times a day. It is obvious, that as the virtues of the root reside in volatile oil; neither decoction nor extract, which would drive it off, is a proper preparation. The infusion is, however, a correct and good form.

INFU'SUM VALERIA'NÆ, INFUSION OF VALERIAN. (*Valer.* ℥ss; *Aquæ bullient.* Oj.) The dose of this is f. ℥iss. or f. ℥ij, repeated according to the urgency of the phenomena.

TINCTU'RA VALERIA'NÆ, TINCTURE OF VALERIAN. (*Valerian.* cont. ℥iv; *Alcohol. dilut.* Oij. Prepared either by maceration or displacement.) The tincture possesses all the virtues of the valerian, but is rarely given alone, on account of the too excitant effects of the alcohol. A drachm may be added to each dose of the infusion.

TINCTU'RA VALERIA'NÆ AMMONIA'TA, AMMONIATED TINCTURE OF VALERIAN. (*Valerian.* cont. ℥iv; *Sp. Ammoniæ aromat.* Oij; made either by maceration or displacement.) The addition of the spirit of ammonia, and the aromatics which are associated with it in the *Spiritus ammoniæ aromaticus*, renders the valerian a more active excitant antispasmodic than the simple tincture. It is an excellent remedy in hysteria, and may be given in the dose of f. ʒj or f. ʒij, diluted with water, and sweetened.

4. GAL'BANUM.

Galbanum is stated, in the United States Pharmacopœia, to be the juice of an unknown plant. It would seem, that no sufficient evidence exists in regard to its origin; nor is the precise country where it is produced ascertained. It is taken to Europe partly from the Levant and partly from India, and is met with in two forms—in tears and in lumps. The latter is the form in which it is usually seen, the lumps being composed of whitish, reddish, or yellowish tears, agglutinated by a darker coloured substance, usually mixed with pieces of stalk, seeds or other extraneous matter. At a freezing temperature, it is capable of being reduced to powder; and at the temperature of boiling water, 212°, is sufficiently soft to admit of being strained. It has a peculiar balsamic smell, and a hot, acrid, bitter taste. On analysis, like assafetida, it yields volatile oil, resin, and gum. Like the other gum-resins it forms a milky mixture with water. Its properties are yielded to proof spirit, which dissolves all except the impurities.

Galbanum has antispasmodic virtues, but to a less degree than assafetida; alone, it is very little employed, however, internally. The dose is from ten to twenty grains given in pill; or it may be formed into an emulsion with the addition of gum arabic, sugar, and water.

PIL'ULÆ GAL'BANI COMPOSITÆ, COMPOUND GALBANUM PILLS. (*Galban.*, *Myrrh.*, āā ℥iss; *Assafœtid.* ʒss; *Syrup.*, q. s. to form 480 pills.) These pills contain half a grain each of galbanum, myrrh and assafetida. They have been long known under the name '*Gum pill,*' and have been much prescribed in Great Britain in hysterical habits. Sometimes, the *Extractum colcynthidis compositum,* or aloes is added, when the object is to make them act on the bowels at the same time. The dose is from gr. x to gr. xx.

EMPLAS'TRUM GAL'BANI COMPOS'ITUM, COMPOUND GALBANUM PLASTER.—*Galban.* ℥viij; *Emplastr. plumbi,* ℔iij; *Terebinthin.* ʒx; *Picis abietis,* ℥iij.) Used in the same cases as the Emplastrum assafœtidæ; but more commonly as a simple excitant plaster, in obstinate tumefactions of an indolent character.

5. DRACON'TIUM.—SKUNK CABBAGE.

Dracontium is the root of *Dracon'tium fœ'tidum, Icto'des fœ'tidus, Symplocar'pus fœ'tidus;* Sex. Syst. Tetrandria Monogynia; Nat. Ord. Aroideæ, which is indigenous in the United States, growing abundantly in meadows and swamps throughout the whole northern and middle sections of the Union; flowering in March and April, and somewhat earlier to the south. Every part of the plant has a disagreeable skunky smell, which resides in a very volatile principle that is dissipated by heat, and is of course diminished by drying. The root is in the secondary list of the Pharmacopœia of the United States. It is collected in autumn or early spring, and is carefully dried.

The dried root, as usually met with, consists of the body, and the separated radicles. The odour is much less than in the fresh root, but continues for some time. It is not, however, fit for use longer than a single season. When chewed it is distinctly acrid. The principle, on which its virtues are dependent, is volatile, and is dissipated by heat; consequently, decoction is an inadmissible form.

In large doses, dracontium is stated to be narcotic; but in medicinal doses, it possesses the virtues of the articles already mentioned. It may be given in the dose of ten or twenty grains of the powdered root; or in infusion. A syrup—prepared from the fresh root—is said to be a domestic remedy. Dracontium is not, however, much used, and the dried root, as met with in the shops, is of very uncertain strength.

6. AMMO'NIÆ PRÆPARA'TA.—PREPARATIONS OF AMMONIA.

All the preparations of ammonia are excitant, and antispasmodic; but the only one that is much prescribed, and the best, is the

SPIRITUS AMMO'NIÆ AROMAT'ICUS, AROMATIC SPIRIT OF AMMONIA. (*Ammon. muriat.* ℥v; *Potassæ carb.* ℥viij; *Cinnam.* contus., *Caryophyll.* contus. āā ʒij; *Cort. limon.* ℥iv; *Alcohol.*, *Aquæ*, āā Ov. Seven pints are distilled.) This is one of the forms of the old *Sal volatile*, much used in popular practice, and in hysteric and nervous affections in general. The result of the process is really ammoniated alcohol, impregnated with excitant volatile oils. The dose is from ♏xx to f. ʒj., given in sweetened water.

Spiritus ammoniæ aromaticus enters into the composition of the *Tinctura Guaiaci Ammoniata*, and the *Tinctura Valerianæ Ammoniata* of the Pharmacopœia of the United States.

7. ÆTHE'REA.—PREPARATIONS OF ETHER.

All the preparations of ether are excitant and antispasmodic. They are very transient and diffusible in their action, and well adapted for cases in which the Spiritus Ammoniæ aromaticus is indicated. In spasmodic asthma, and other forms of dyspnœa of a nervous nature, they often afford great relief, when dropped on sugar, and inhaled into the air passages. In all cases of severe internal spasm, the preparations of ether are almost always had recourse to, either alone or associated with narcotics.

1. Æther Sulphu'ricus, *Sulphuric Ether,* (described under Excitants.) The dose of this is f. ʒss. to f. ʒij, dropped on sugar, to which a little water is added; or it may be incorporated with any aqueous mixture, by rubbing it in a mortar with two grains of spermaceti to each fluidrachm of the ether.

2. Spir'itus Æ'theris Sulphu'rici Compos'itus, *Compound Spirit of Sulphuric Ether,* (see Narcotics. p. 383.) Hoffmann's anodyne liquor is more frequently used as an antispasmodic in hysteric and hysteroid cases than any other of the ethereal preparations. The dose is f. ʒss. to ʒij, in the same vehicle as the æther sulphuricus.

3. Spir'itus Æ'theris Ni'trici, *Spirit of Nitric Ether,* (see Diuretics. p. 277.) Sweet spirit of nitre has the virtues of the preparations already mentioned; but it is not so often given as an antispasmodic. The dose is f. ʒj to f. ʒij, in a little water.

8. LAVAN'DULA.—LAVENDER.

Lavender—as elsewhere shown—is an aromatic excitant, (see Excitants;) and when its volatile oil is imparted to water, or to dilute alcohol, the preparation is by no means agreeable to the taste of most persons. It, consequently, along with its excitant action on the nerves of the stomach, powerfully impresses those of gustation. The preparation most frequently prescribed as an antispasmodic and nervine, is the

SPIRITUS LAVAN'DULÆ COMPOSITUS, COMPOUND SPIRIT OF LAVENDER. (See Excitants.) This is a favourite agent in hysterical and hypochondriacal cases, and is much used as a popular remedy in all cases of nervous faintness, and anomalous symptoms of a similar character. The dose is f. ʒss. to f. ʒj, dropped on sugar, or taken in a small quantity of sugared water.

9. MOSCHUS.—MUSK.

Musk is a peculiar concrete juice, obtained from *Moschus moschif'erus,* the *musk animal,* a wild ruminating quadruped, rather larger than the domestic goat, and approaching the deer in its characters, which inhabits Thibet and other parts of central Asia, but more especially the Himalaya and Altai mountains. At the posterior part of its abdomen, a small sac is situate, immediately under the skin, which opens a little in front of the preputial orifice for the penis, and is filled with a thick fluid, particularly abundant in the rutting season. This fluid, when dried, is musk. It is removed from the animal, with the bag that contains it, and is dried for exportation.

Two kinds of musk are met with in commerce,—the China, Tonquin, or Thibet; and, the Siberian, Russian, or Kabardine, which is an inferior kind.

The musk-bag or musk-pod is generally plane on one surface; convex on the other,—the plane surface being usually bare; the convex covered with brownish-yellow, or grayish or whitish bristle-like stiff hairs, arranged concentrically around the orifice of the sac; but, at times, the plane surface is covered with hairs, and the other is not. The remains of the penis are always discoverable. (*Pereira.*) The pods are about 2½ inches long, and 1¾ broad; and they weigh, on an average, six drachms and a scruple; and contain about two drachms and forty grains of musk.

The musk itself, or *grain musk*, is granular—as the name imports—of an unctuous feel, of a dark reddish-brown colour, and mixed with hairs. It has a bitter aromatic taste; and a characteristic smell, which is agreeable to most persons, but the contrary to some. It is an odour, which is not restricted to the musk animal, but is exhaled by others, and by some plants.

The only invariable distinction, which Dr. Pereira has observed between the Chinese and the Siberian musk, is in the scent, which is much less powerful in the latter, and more nauseous and disagreeable, being somewhat empyreumatic.

The quantity of musk imported into England is considerable. On an average of three years, ending with 1832, the imports of musk from all places eastward of the Cape of Good Hope, with the exception of China, amounted to 4965 ounces a year. (*McCulloch.*)

Musk has been frequently subjected to analysis, but the odorous principle has not hitherto been isolated. Artificial pods of musk are not uncommonly met with, of which Dr. Pereira says he has seen several imported from Canton. This is called *Wampo musk*, and the mode, in which these pods are distinguished from the genuine, is by the absence of any aperture in the middle of the hairy coat, the hair not being arranged in a circular manner, and by the absence of the remains of the penis. The odour of the musk in these spurious sacks is ammoniacal. Musk is, likewise, subjected to various admixtures, and especially with dried blood.

Musk is unquestionably excitant, and, by reason of its excitant property, as well as by powerfully impressing the nerves of smell, it is antispasmodic. Jörg found it to be hypnotic in small doses; and in large doses it caused headache, tremors and even convulsions. Other observers, however, (*Trousseau & Pidoux,*) experienced neither excitant nor hypnotic effects from it, but it appeared to them to stimulate the genital organs. It is in the neuroses and in spasmodic affections, that it has been most prescribed,—for example, in hysteria, epilepsy, convulsions of children, chorea and hiccough; and it has been given in tetanus. Its excitant properties have led to its use in low fevers, accompanied with much nervous debility; in retrocedent gout, &c. It is not, however, worthy of the reputation, which it had at one time, whilst it is a very expensive article, and by no means always pure. Hence, it is not much employed at the present day.

The medium dose is ten grains, to be repeated every two or three hours in the form of bolus; or it may be suspended in water by means of mucilage of gum arabic and sugar. It has been given in the form of enema in the convulsions of children.

10. SUC'CINUM.—AMBER.

The **O'LEUM SUC'CINI RECTIFICA'TUM** or **RECTIFIED OIL OF AMBER**, as elsewhere shown, is excitant, and by reason of its powerful impression on the nerves of gustation and olfaction, is likewise antispasmodic. It has been given in the various neuroses, in which antispasmodics in general are indicated, in the dose of from gtt. v. to gtt. xv., dropped on sugar, or made into an emulsion with mucilage of gum arabic and sugar. It has been advised also locally in hooping-cough, and convulsions of children, mixed with an equal portion of laudanum, and diluted with three or four parts of olive oil and brandy. This was a favourite prescription with the late Dr. Parrish, of Philadelphia.

11. CREASO'TUM.—CREASOTE.

The powerful sensible properties of this substance, described elsewhere, (see ASTRINGENTS,) would naturally suggest its employment as an excitant antispasmodic; yet it has not been much used as such, although, in well regulated doses, it may be as efficacious as any of the class. In certain cases of neuralgia, advantage appears to have been derived from it, although, in general, it was of little or no service. Good effects have followed its use in hysteria—of course when there was no inflammatory complication, as well as in spasmodic erethism of the nervous system, and in palpitation. (*Elliotson.*) It has, also, been used with benefit in hysteric croup, in the way of inhalation (*Herndon*, of Virginia,)—thirty drops being added to a quart of hot water.

The dose may be a drop or two of creasote given occasionally in gum water; or the following mixture may be prescribed. (*Creasot.* ♏iv; *Aq. camphor.* ℥vj. M. Dose, one quarter.)

12. Certain *Volatile Oils*—besides those already mentioned, as the Oleum Terebinthinæ, Dippel's Animal Oil, the Oleum Cajuputi, &c., which, along with their excitant qualities, make a powerful impression on the nerves of gustation and olfaction, are generally classed amongst the antispasmodics. Their general properties are described elsewhere. The same may be said of Camphora. (q. v.)

SECTION VII.

AGENTS THAT AFFECT PROMINENTLY THE ORGANS OF REPRODUCTION.

1. EMMENAGOGUES.

Synon. *Menagoga.*

Definition of emmenagogues—Modus operandi—No direct emmenagogues—Special emmenagogues.

Emmenagogues may be defined—"Agents, that promote the menstrual discharge." That there are any such specific agents is by no means established. In the present state of our knowledge, indeed, we may affirm, that none exist. Experience alone has taught us this; for there is obviously no more reason, why there should not be substances capable of exerting a remedial agency on the organs concerned in the function of menstruation, than that there should not be others, which exert a cathartic or emetic operation by their preference for the stomach and intestines.

The views of Dr. Paris on this division of medicinal substances closely correspond with those of the author.—"As amenorrhœa, or retention of the menses," he says, "is generally the effect of a morbid state of the body, it follows, that remedies capable of acting as emmenagogues can only be *relative* agents, unless indeed we are disposed to accede to the opinion so generally maintained in the writings of the older physicians, but now generally discarded, that certain substances exert a specific action upon the uterus. It may certainly be asserted without fear of contradiction, that there are many substances, which, when received into the stomach, have their stimulant operation more particularly determined to one part than to another;—alkalies, for example, to the kidneys; cantharides to the bladder; mercury to the salivary glands, &c. Reasoning therefore by analogy, it was not unphilosophical to conclude, that similar medicines might exist with respect to the uterus; but experience has negatived the supposition, there being no proof of any of the substances styled *emmenagogues* producing their effects by any *specific* influence upon the uterine system. If the term *emmenagogue* be assumed conventionally, according to this view of the subject, it may be retained without any fear of error, otherwise it would be wiser to remove the name from our classification."

One of the most recent writers on Materia Medica and Therapeutics, (*A. T. Thomson,*) has given us the following table of *direct* emmenagogues, or, in other words, of such as are "supposed to operate by their stimulant influence, on the uterus itself," and he has subdivided them, it will be observed, into *immediate* and *mediate.* "In the second of these subdivisions," he remarks, "some substances will be found, the direct influence of which on the uterus is doubtful; they maintain their place rather in conformity with the prevailing opinions, than from a conviction that their action on the uterine system is such as to authorize the position which they hold."

"Direct Emmenagogues:

1. IMMEDIATE.

a. Electricity.—Electricitas.

2. MEDIATE.

* *Organic Products.*

b. Oleo-Resins.—Contained in
Roots—Polygala *Senega.*
Ruta *graveolens.*
Herb.—Juniperus *Sabina.*

c. Bitter Principle.—Contained in
Roots.—Rubia *Tinctorum.*

** *Inorganic Substances.*
d. Mercurials.—Præparationes" (Præparata) "Hydrargyri."—

Yet none of these agents can be properly regarded as producing their effect by any specific operation on the uterus. The only one, which we *know* to operate upon that organ—inasmuch as we can subject the region directly to its action—is electricity; and it does so only by virtue of that excitant agency, which it exerts upon every other tissue—not by a special action, which can entitle it to the appellation of a *true* or *direct* emmenagogue. Dr.

Thomson's doubt of the propriety of his own classification, and of the admission of direct emmenagogues, is signally shown in the following remarks, after he has described the fancied emmenagogue virtues of the different articles comprised in the list just cited. "Upon the whole, from what has been said, it is obvious, that electricity is the only direct emmenagogue, and that the idea of the others acting upon the uterus itself is rather inferred than certain. It is nevertheless true, that, in whatever manner they act, emmenagogues stimulate the uterus; and therefore some caution is requisite to be observed in their administration. We must be certain, in the first place, that the suppression is not connected with pregnancy: in such a state, it would be highly injurious to prescribe direct emmenagogues; as not only abortion may be induced, but inflammation may be set up, and lay the foundation of an organic disease of the uterus. There is often, indeed, much difficulty in deciding upon the propriety of employing direct emmenagogues, even when the suppression is not connected with pregnancy: the uterus may be in such a state of active disease as to render their influence upon it extremely hazardous."

Much harm has arisen from a belief in the existence of direct emmenagogues, without discriminating the causes that may have given rise to the suppression of the menstrual secretion. In all cases, such causes must be appreciated, and the treatment be directed to their removal, as well as to that of the morbid condition of the general system, or of the uterus, produced by them. Accordingly, emmenagogues must always be of an indirect kind, and the term, as Dr. Paris has suggested, should be retained as conventional, to express such an indirect operation. Most commonly, amenorrhœa is connected with a state of atony of the general system, which demands the use of excitants; and hence, amongst the reputed emmenagogues, we have a long catalogue of substances belonging to the divisions of excitants proper, and of tonics. The oxides and salts of iron have been especial favourites with the practitioner; and, accordingly, we find enumerated, under the present division of remedial agents, the carbonate, the sulphate, the black oxide, the alkaline solution, the ammoniuret, the tartrate, &c. of that metal. But, although atony may be the general cause of amenorrhœa, the disease is sometimes induced by an opposite condition of the system, in which excitants would be manifestly improper, and remedies of another kind be clearly indicated. This is not the place to inquire, whether menstruation be a process of secretion, or of simple transudation of blood through the parietes of the vessels of the uterus. The author has elsewhere expressed the opinion, (*Human Physiology*, 4th edit., vol. ii., p. 352, Philada. 1841,) that it is a secretion, and that the fluid differs somewhat from mere blood, but whether we regard it in this light, or as a periodical hemorrhage, it is clear, that the lining membrane of the uterus must be a centre of fluxion, nervous and vascular, during the period of the flow; and if any powerful mental impression be made, when the discharge is about to take place; or a source of morbid irritation be present in any viscus; or if there be undue energy in the system generally, and in the uterus in particular,—or an opposite state; the due concentration of nervous and vascular energy towards the uterine system may be interfered with, and amenorrhœa supervene, and continue until such distracting cause is removed.

From what has been observed regarding the conditions of the general system, which may occasion amenorrhœa, it will be easy to understand, that the plan of medication must, in all cases, vary, according to the state of the general health. But remedies may be administered as emmenagogues, which act little on the general system, and affect the uterus by contiguous sympathy chiefly. Thus, if that viscus be in a state of asthenia, a diuretic or local stimulant to the kidneys may prove emmenagogue; and, in the same manner, a cathartic, especially one that acts on the lower portion of the intestinal canal, may excite the uterus to the point appropriate for the fulfilment of its healthy functions. On these grounds, aloes, as elsewhere seen, has acquired its reputation as an emmenagogue, and there is, perhaps, no article of the materia medica, which has been so extensively administered with this view. It appears to have no direct operation on the uterus: its agency is confined to its cathartic powers,—the local stimulation, thus induced, extending by contiguous sympathy to the uterus, and, in this indirect manner, occasionally producing a restoration of the suppressed secretion.

Formerly, the condition of the uterus was looked upon as exerting a predominant influence on the rest of the economy, and as the cause of various morbid phenomena, which could not well, in the existing state of knowledge, be referred to any other agency. The protean symptoms of hysteria, as the name imports, were all considered to be engendered in the uterus. The name, still retained, and the terms *præfocatio matricis*, *vapores uterini*, *strangulatio uterina*, and the German names *mutterkrankheit*, *mutterbeschwerden*, and *mutterbeschwerung*,—from *mutter*, 'the uterus,'—sufficiently indicate the supposed seat of the mischief. It is now admitted to be caused by cerebro-spinal irritation, connected in particular cases with uterine disturbance,—such disturbance, however, appearing to act indirectly only, by producing, or developing general nervous irritability; and this view is confirmed by the fact, elsewhere mentioned, that well marked hysteria is occasionally met with in men. (See the author's *Practice of Medicine*, ii. 324, Philad. 1842.)

The condition of the uterine functions has always to be looked to,—especially in chronic diseases,—but experience has shown, that any aberration of those functions is more frequently the consequence than the cause of such diseases. The author cannot, indeed, conclude the consideration of emmenagogues better than by citing the following apposite remarks of a writer already cited, (*Dr. Thomson,*) at the termination of his investigation into the properties usually assigned to this class of remedies. "The importance of the catamenia in preserving the health of the female habit is undeniable; and therefore everything that can tend to maintain its regular return, and to promote its due quantity, is of great importance in a practical point of view. In every chronic complaint of a female it is requisite to ascertain the state of the catamenia; but, before advising any medicine for the purpose of influencing the uterus in any manner, the cause of the suppression or the irregularity, of whatever description it may be, must be minutely investigated. Without obtaining such a knowledge of the state of the organ, and ascertaining how far the suspension or irregularity is due to the condition of the organ itself, or to the general system, our practice must ever be uncertain: in floundering about, and trying various remedies, without rule or discrimination, we may, it is true, stumble by accident on something effectual; but much evil may be produced."

The local means, that are most frequently employed with the view of soliciting the blood towards the uterus, or the lower part of the body—are pediluvia and semicupia; fomentations to the generative organs; warm injections into the vagina or rectum; leeches to the pudendum and inner sides of the thighs; cupping over the latter region; and bleeding from the feet; but these, to be useful, ought to be employed about the expected period of recurrence of the catamenia, and especially when general or local polyæmia exists. Frictions have, likewise, been made over the lower extremities, and electricity—as will be seen—has been used to arouse the uterus, where there has been reason to suspect torpor of that viscus.

Whatever agents are employed, must be prescribed with due caution, and with proper attention to the pathological condition, that gives occasion to the amenorrhœa.

SPECIAL EMMENAGOGUES.

I. *Cathartic Emmenagogues.*

1. A'LOË.—ALOES.

Under another head, (p. 169), it was shown, that the cathartic effect of aloes is exerted chiefly on the lower part of the intestinal canal; and it has been just remarked, (p. 413,) that by contiguous sympathy, it may excite the uterus, so as to favour the recurrence of the menstrual secretion, when it has been arrested by any cause which a local excitant is capable of removing; its action on the rectum, and extension of this action to the uterus, producing a state of the organ closely allied to that, which is the result of the application of a direct stimulus." (*A. T. Thomson.*) It has been affirmed, however, that aloes has a decided tendency to the uterine system, and Dr. Wood adds, that he can see no reason why the medicine should not act specifically upon the uterus, and that its influence in promoting menstruation is by no means confined to cases in which its action upon the neighbouring intestine is most conspicuous.' It is true there is no reason; but, at the same time, there appears to be no adequate evidence, that any such special action on the uterus is exerted by aloes; and it certainly has not seemed to the author to be more efficacious than other excitant agents thrown into the rectum in restoring the catamenia. Cullen was, indeed, of opinion, that it rarely succeeds; and most unquestionably it often fails:—more frequently than could well happen, if any special action were exerted by it upon the uterine vessels.

When not given in the form of *enema*, which, in the London Pharmacopœia, is directed to be made of *Aloes*, ℈ij; *Carbonate of potassa*, gr. xv; *Decoction of barley*, Oss.,—a short time before the expected return of the catamenia,—one of the following formulæ may be prescribed, for two or three days prior to the expected menstrual period.

PIL'ULÆ AL'OES ET MYRRHÆ, PILLS OF ALOES AND MYRRH, (p. 171.) These pills, commonly called *Rufus's Pills*, are given in the dose of ten to twenty grains.

PULVIS A'LOES ET CANELLÆ, POWDER OF ALOES AND CANELLA, (p. 171.) This powder so long known under the name of *Hicra Picra*, or the holy bitter—vulgarly pronounced *Hikry Pikry*—is a popular remedy in amenorrhœa, either taken alone or mixed with wine or brandy. Its dose is from ten to twenty grans.

TINCTU'RA A'LOES ET MYRRHÆ, TINCTURE OF ALOES AND MYRRH, (p. 171.) The properties of this tincture are like those of the *Pilulæ Aloes et Myrrhæ.* The dose is f. ℥ss. to f. ℥ij.

VINUM ALOES, WINE OF ALOES, (p. 171, 273.) The dose of this in amenorrhœa is f. ℥i. to f. ℥ij.

Besides aloes, other cathartics, as *colocynth, gamboge, rhubarb,* and *croton oil,* are occasionally administered as emmenagogues, but by no means so frequently as it.

2. HELLEB'ORUS.—BLACK HELLEBORE.

This is the root of *Helleb'orus Niger, Black Hellebore,* or *Christmas Rose;* Sex. Syst. Polyandria Polygynia; Nat. Ord. Ranunculaceæ; an herbaceous plant, which is a native of various parts of Greece, as well as of the Levant, and inhabits sub-Alpine woodland regions in the middle and southern parts of Europe. It flowers between December and February, and hence its name,—*Christmas Rose.* It is cultivated in the gardens, chiefly in consequence of the period of the year at which it flowers. The hellebore of antiquity appears to have been *Helleb'orus officina'lis.* It is usually imported into England from Hamburg, but sometimes from Marseilles. (*Pereira.*)

Black hellebore root consists of a black root stock, and numerous fibres or radicles, which are of a brownish black colour externally, whitish or yellowish within, and of about the thickness of a straw. The smell is feeble, and like that of senega root; and the taste slight at first, and afterwards bitterish, nauseous and acrid; but, as met with in the shops, it does not exhibit much acridity. The active properties would seem to be dependent upon an acrid oil. They are extracted by both water and alcohol.

Black hellebore, in over doses, is an acro-narcotic poison. In medicinal doses, it is emetic and cathartic; but, although much used by the ancients in head affections, and especially in insanity, it is now never used as a simple cathartic or emeto-cathartic. Many, however, of the present day, have great confidence in its emmenagogue virtues, which some have ascribed to its possessing a specific action on the uterus; but the majority, with more propriety, refer its action on that organ to its effect upon the intestinal canal. Dr. Mead believed it to be superior to any other emmenagogue.

The dose of the powdered root, as an emmenagogue, is from gr. v. to gr. x. or more, according to the effects.

TINCTU'RA HELLE'BORI, TINCTURE OF BLACK HELLEBORE. (*Hellebor.* contus. ℥iv; *Alcohol. dilut.* Oij; prepared either by maceration or displacement.) The dose of this preparation is from f. ʒss. to f. ʒi.

EXTRAC'TUM HELLEB'ORI, EXTRACT OF BLACK HELLEBORE. (Made, by the process of displacement, from *black hellebore* in coarse powder.) This preparation, which is not officinal in any of the British Pharmacopœias, purges drastically in the dose of twelve or fifteen grains. It is rarely or never employed as an emmenagogue.

Bacher's Pills, formed of this *extract* and *myrrh*, each ℥i; powdered leaves of *carduus benedictus* ʒiij,—were introduced into the French codex under the name *Pilulæ ex Helleboro et Myrrhâ*, and had a high reputation as an emmenagogue; but they are not much, if at all, used.

II. *Excitant Emmenagogues.*

As the condition of amenorrhœa is so often dependent upon an asthenic condition of the system, a multitude of excitants have been employed, including almost all those, that are usually regarded as antispasmodics; the following have, however, been held in highest repute by different therapeutists.

3. ASSAFŒ'TIDA.—ASSAFETIDA.

It has been long maintained, that assafetida has a specific action on the uterus, and the results of various observers appeared to show, that it was capable of bringing on the menstrual discharge sooner than usual, (*Jörg*); but if it be admitted, that such is the result of the use of assafetida in health—for the experiments were made on healthy individuals—it is by no means admitted, that the same result would follow in disease; and accordingly, assafetida is now rarely or never employed in amenorrhœa, and the same may be said of

4. CASTO'REUM.—CASTOR, and

5. GAL'BANUM,

Which were used as emmenagogues by the ancients; and are still occasionally employed, but not in this country, in affections, that are complicated with obstruction of the catamenia.

6. HEDEO'MA.—PENNYROYAL.

This herb—as stated under Excitants—is indebted for its properties to the essential oil, which it contains. It is a popular emmenagogue, but is rarely prescribed by the physician. It is usually given copiously in the form of hot *Pennyroyal tea;* the feet being, at the same time, placed in warm water; or in a mustard pediluvium.

European Pennyroyal—Mentha Pulegium—is considered to possess the same properties, and is used as a domestic remedy by European females.

7. JUNIP'ERUS VIRGINIA'NA.—RED CEDAR.

This evergreen, Sex. Syst. Diœcia Monadelphia; Nat. Ord. Coniferæ, grows in every part of the Union. The leaves are in the secondary list of the Pharmacopœia of the United States. They have a strong characteristic odour; and an aromatic bitterish taste. The essential properties reside in volatile oil; and, besides, tannin exists in them.

The medical virtues of juniperus virginiana are analogous to those of savine, but less in degree. It is, indeed, frequently known throughout the country by the name of *Savine.* (*Prof. Bigelow.*) It may be given as an emmenagogue, in infusion, (*Junip. Virginian.* ʒij; *Aquæ,* Oss. Dose, f. ℥iss. to f. ℥iij;) but it is not often prescribed.

8. SABI'NA.—SAVINE.

Savine is the tops of *Junip'erus sabi'na* or *Common savine,* which is a native of the south of Europe, and of Asiatic Russia, but thrives under cultivation in Great Britain. It is said also to grow wild in the neighbourhood of the northwestern lakes. (*Wood & Bache.*) The tops have a strong characteristic smell, especially when bruised; and a disagreeable, bitter, acrid taste; and these properties are retained, to a certain extent, when the tops are dried.

The medical properties of savine, are chiefly dependent upon an essential oil, which is officinal; and they are yielded to water, alcohol, and fixed oils. The leaves have been recently subjected to analysis, and have yielded the following constituents—gum, tannin, resin, chlorophylle, fixed oil, *volatile oil,* salts of potassa, lime, and bitter extractive. (*C. H. Needles.*)

Savine, in large doses, is an acrid poison, inducing vomiting, purging, and every sign of violent inflammation of the lining membrane of the stomach and intestines. In one case, in which the oil had been given with the view of inducing abortion, it caused violent nephritis. It is by reason of its powerful action on the system of the mother that it is sometimes effective in separating the connection between her and the fœtus, and thus occasioning the expulsion of the latter. Fatal cases are, indeed, recorded, where it had been given as an emmenagogue. Dr. Francis Home, of Edinburgh, highly extolled it in amenorrhœa dependent upon torpor of the uterus; but it has not been much used of late, in consequence of the uncertainty, and at times of the severity, of its operation. Recently, Dr. Pereira has affirmed—as the result of his own observation, that it is the most certain and most powerful emmenagogue of the materia medica; that he has employed it in numerous cases, and has never seen any ill effects from its administration.

The dose of the powder is from gr. v. to gr. xv. repeated three or four times a day. It may, likewise, be given in infusion, (*Sabin.* ʒj; *Aquæ bullient.* Oss. Dose, one or two table-spoonfuls.)

OLEUM SABINÆ, OIL OF SAVINE. This oil is obtained from savine by distillation. It has the odour of the plant; and an exceedingly acrid bitter taste. It is used in the same cases as the savine itself, and is the preparation generally employed when the object is to induce abortion. This it accomplishes by the violence it does to the system of the mother, inducing gastro-enteritis and nephritis, and occasionally death. As an emmenagogue, the dose is from two to six drops, made into a mixture with sugar or mucilage. Dr. Pereira regards the oil as by far the most convenient and certain preparation of savine, and it is the one which he always employs.

9. RUTA.—RUE.

Rue is the root of *Ruta Grav'eolens*, *Common* or *Garden Rue;* Sex. Syst. Decandria Monogynia, Nat. Ord. Rutaceæ; a perennial plant, which is indigenous in the south of Europe and the Levant; and is often cultivated in the gardens of this country. It flowers from June to September. The leaves are officinal in the secondary list of the Pharmacopœia of the United States.

The herb has a strong disagreeable odour, which is dependent upon a volatile oil, obtainable by distillation,—the *Oleum Rutæ* of the Dublin and Edinburgh Pharmacopœias. It contains, also, bitter extractive. The taste of the leaves is bitter and acrid; and when fresh, they irritate the skin, and, at times, even excite vesication. They yield their virtues to hot water.

From what has been said, it is obvious, that rue is a powerful excitant; hence, and as it makes also a powerful impression on the nerves of gustation and olfaction, it proves antispasmodic, and is frequently used as a domestic remedy in hysteric and other nervous affections. It is not often prescribed, however, by the physician, as an antispasmodic. Amongst the *laity*, it has great reputation as an emmenagogue; and some practitioners have believed it to be not only as useful in catamenial obstructions as other more esteemed emmenagogues, but have thought its action to be so peculiarly directed to the uterus as to be capable of inducing menorrhagia, abortion and inflammation. (*Christison.*) It is rarely, however, used by the profession as an emmenagogue.

The dose of the powder is from fifteen to thirty grains, two or three times a day; but it must be given with caution, as there is some reason to believe it to be an acro-narcotic poison.

It is more commonly given in infusion—*Rue Tea.* (*Rutæ,* ʒj; *Aquæ bullient.* Oj. Dose, f. ʒiss. to f. ℥ij.)

Oil of rue is sometimes prescribed in the dose of two to six drops in sugared water.

10. RU'BIA.—MADDER.

Madder is the root of *Ru'bia Tincto'rum*, *Dyer's Madder;* Sex. Syst. Tetrandria Monogynia; Nat. Ord. Rubiaceæ, a native of the south of Europe and the Levant, which is cultivated in various parts of the continent of Europe; and is exported largely from the Levant, Holland, and the south of Europe. It contains a variety of colouring matters—the most important of which is the madder-red or *Alizarin.* (*Pereira.*) The root—which is officinal in the secondary list of the Pharmacopœia of the United States—is long, cylindrical, of about the thickness of a writing-quill, and of a deep, reddish-brown colour externally. The woody meditullium is yellow when fresh, but becomes reddish by drying. The odour of the root is weak and peculiar; the taste bitter and astringent.

Madder has been considered by some to be possessed of emmenagogue virtues; and Professor F. Home, of Edinburgh, believed it to be the strongest and safest emmenagogue known. It may be of service, when tonic emmenagogues are indicated, but it has not the confidence of physicians, and is, therefore, scarcely ever used. Its remarkable property, of colouring the bones of animals fed on it red, is well known.

The dose of madder may be half a drachm, repeated three or four times a day.

11. TANACETUM.—TANSY.

Tansy—whose general properties are described under Anthelmintics (p. 213)—has been much used in domestic practice in uterine affections. It has borne the reputation of an emmenagogue; and, by virtue of its bitter principle, and essential oil, it may act as such in cases where the excitant emmenagogues are indicated. In popular practice, it is supposed even to arrest uterine hemorrhage; and, in the southern States, the author has known a bag of tansy placed over the abdomen to restrain the flow. It is scarcely ever prescribed by the regular practitioner.

12. ELECTRICITAS.—ELECTRICITY.

The excitant influence of electricity (see Excitants) can be made to bear immediately upon the uterus, when, from the attending phenomena, there is reason to believe, that amenorrhœa is dependent upon torpor of that organ.

The practitioner has it in his power to graduate the amount of excitation. Thus, where a gentle stimulation is needed, it may be sufficient to insulate the individual, and to draw electricity from the pelvic region in the form of the electric pencil; where a greater degree is needed, by sparks; and where a still greater, to make the uterus a part of the electric circuit, and to discharge a Leyden jar through it—graduating properly the extent of the discharge according to the demands of the case.

Or, Galvanic Electricity may be substituted, or the shocks produced by interrupted currents, as by the electro-magnetic apparatus.

Such are the prominent articles that have been used as emmenagogues. Besides them, however, others have been proposed by different observers. A recent writer, (*Churchill,*) expresses the opinion, that Iodine, Ergot and Strychnia, are the least doubtful in regard to their power of acting on the uterus. The iodine may be given in the form of *Tinctura Iodini composita*, (q. v.), the dose of which may be gtt. x. to gtt. xxx. three times a day. Ergot may be prescribed in powder, gr. v.—x. two or three times a day, and strychnia, in the form of tincture, (p. 388,) from six to twenty-four drops, twice or thrice a day. It is very doubtful, however, whether any of these agents be entitled to any reputation; indeed, they have been classed, along with others, by a recent respectable writer, (*Ferguson,*) as *nostrums.* "There are numberless nostrums"—he remarks—"of greater or less value, which, from their very number, prove how capricious a disease is amenorrhœa, and how curable. Dale excites the mammæ by repeated application of one or two leeches; the organ enlarges greatly, and the uterus sympathizes on being thus aroused. Very many authors give five to eight grains of ergot. Carron du Villard recommends cyanuret of gold in minute doses; Bradley gives strychnine; Brera, iodine; Amussat applies an exhausted glass to the uterus, and Rostan, leeches." (See the Author's *Practice of Medicine,* ii. 459. Philad. 1842.)

The tincture of guaiacum, so highly extolled by Dr. Dewees as a specific in amenorrhœa and dysmenorrhœa, might be classed in the same category.

II. PARTURIENTS.

SYNON. *Parturientia, Abortiva, Amblotica, Phthoria, Apophthoria, Ectrotica, Abortives.*

DEFINITION OF PARTURIENTS—MOST OF THEM INDIRECT AGENTS—OFTEN DESTROY THE MOTHER—ARISTOLOCHICS—SPECIAL PARTURIENTS.

What has been said of emmenagogues might, perhaps, be extended to the division of parturients or abortives, which have been defined—'substances that promote the parturient energy.' (*Eberle.*) Certain it is, that fifty years ago, no man of science, in this country, would have asserted, that we are possessed of any agent, that acts by virtue of specific powers over the uterine fibres. Since that period, however, such an agent—ergot—has been brought to the notice of the profession, and has received so many testimonials in its favour as to cause its admission into every work on Materia Medica. In no country has this substance been more employed than in the United States, and in no country has it so many supporters. Yet there are many, who, from their experience, are not satisfied that it exerts the power over the gravid uterus that has been ascribed to it. It must be admitted, that no cases could present themselves, in which it is more difficult to trace accurately the relation between cause and effect. Every one, who has practised extensively in obstetrics, must have observed, that the parturient efforts occasionally flag, and indeed are wholly suspended, yet they recur, and the labour proceeds rapidly to a favourable termination. Now, if in any such case, a remedy, presumed to be parturient, were administered during the period of the cessation of pain, the recurrence of the pain in this sudden manner, could hardly fail to be ascribed to the antecedent—the administration of the presumed parturient. Let the obstetrical practitioner, who has never had recourse to any such agent, call to mind, how few the cases are, in which delivery has had to be assisted, in consequence of the *total* cessation of the pains, and how common it is to meet with a partial or temporary cessation; and he will see, that the absolute necessity for the use of a parturient is not a common occurrence.

But, if hesitation be indulged in regard to the possession by the ergot of any specific powers over the uterus, there can be none as respects the other substances, that have been employed as parturients. All these are indirect agents, and act only upon the ovum through the mother, endangering her life, as well as that of her infant. The remark of the poet of antiquity, that "she who destroys her offspring *in utero*, often perishes—(*sæpe suos utero quæ necat, ipsa perit*,")—is admitted to be correct by all writers on medical jurisprudence, and by every one who has at all investigated the subject. The drugs and agencies, employed with the view of inducing abortion are of the most powerful kind,—emetics, purgatives, acro-narcotic poisons, mercury, &c. Bleeding, too, has often been practised with this intent, but it has rarely or never been successful.

ARISTOLOCHICS.

The German writers admit a class *Aristolochica*, or agents which promote the lochial secretion, (*Conradi;*) but it need scarcely be said, that there are no such direct agents, and that the pathological cause of the suppression or diminution of the discharge must always be appreciated and combated. Warm fomentations over the uterine region, warm injections into the vagina and rectum, leeches to the labia pudendi or to the inside of the thighs, are amongst the topical remedies which are employed to solicit blood towards the uterine region; but these agents cannot be proper in all cases, and their employment must be regulated by general principles.

SPECIAL PARTURIENTS.

1. ER'GOTA.—ERGOT.

Ergot, *seca'lē cornu'tum*, or *spurred rye*, from French, *ergot*, 'a spur,' is generally considered to be the result of a disease in rye, occurring most frequently when a hot summer succeeds a wet spring.

For the various opinions that have been entertained in regard to ergot, the reader is referred to another work, (*New Remedies*, 3d edit. p. 431, Philad. 1841.) It may be sufficient to state, that the diseased state of the grain is occasioned by the growth of a fungus not previously detected, and to which Mr. Quekett gives the name *Ergotæ'tia abor'tans.*

Ergot consists of grains from a third of an inch to an inch and a half long, and from a line to three lines in diameter, usually curved like the spur of a cock, whence the name,—having commonly two longitudinal furrows, and being often irregularly cracked and fissured. Externally, it is of a dingy purple hue, but internally of a pale grayish red, or grayish white. Its odour is peculiar, fishy and nauseous; and taste obscurely acrid and disagreeable. Unless kept excluded from the air, it swells and softens, acquiring a deep black colour, and heavy smell, and becoming infested by a little acarus, which is about one fourth the size of the mite of cheese, and destroys the interior of the ergot, leaving the grain as a mere shell. In four months, seven and a half ounces of fæcal matter of the acarus were formed from seven pounds of ergot. (*Pereira.*) The powder becomes quickly damp, and full of animalcules. The ergot should, therefore, be fresh; certainly it ought not to be kept for more than two years. When examined with the microscope, its internal structure is found to consist of minute roundish cells, many of which contain particles of oil; and the bloom seen, at times, on its surface, appears to be composed of the sporidia of the fungus to which it is believed, by many, to owe its origin.

Various analyses have been made of ergot by Vauquelin, Maas, Bonvoisin, Pettenkofer, Winkler, Robert, Wiggers, and Wright. The analysis of the last gentleman is considered to be the most accurate. He found it to consist, in 100 parts;—of thick white oil, 31.00; osmazome, 5.50; mucilage, 9.00; gluten, 7.00; fungin, 11.40; colouring matter, 3.50; fecula, 26.00; salts, 3.10; loss, 3.50. Dr. Wright considers it to differ from sound rye, chiefly in the presence of oil, osmazome, and fungin.

Ether and the volatile oils remove its active part. It would appear, however, that its activity resides in the fixed oil, which may be readily obtained from the powder by agitation with sulphuric ether, and expulsion of the ether by spontaneous evaporation.

As it is important to judge between a good and a bad specimen of ergot, Dr. Wright states, that if it be clear and smooth on its surface, not powdery; of a deep purple colour; neither entirely black nor light brown; have a full strong odour; break clearly, exhibiting a pink blush internally; be unpunctured by insects; burn with a clear jetting flame, and be of a less specific gravity than water, its activity may be trusted.

The effects produced by ergot, when eaten as food, are referred to elsewhere; as well as the sedative influence, which it is capable of exerting in various diseases. The extraordinary property ascribed to it of assisting the parturient efforts alone falls under consideration here. This has been long credited in Germany; as the old German names *Mutterkorn* (*womb grain*), and *Gebärpulver*, parturient powder, and the *Pulvis Parturientis* of the Marburg Pharmacopœia, sufficiently testify.

Between thirty and forty years ago, it was recommended in this country by Dr. Stearns, of Saratoga county, New York, and since that time, an immense mass of evidence has been adduced in its favour. Still, there are many, who deny it all power over the uterus, both in the unimpregnated and the impregnated state, and who affirm, that it acts only indirectly on that viscus through the general disturbance it occasions. Such is the opinion of a modern experimenter (*Jörg*), who affirms as the result of his experiments and observations, that "there is no further connexion between these degenerate grains and the uterus, than the word *mutter* ('uterus'), which is common to both." From his various experiments, Dr. Jörg infers, that ergot, when taken in small doses, produces little or no effect upon the functions, but when fresh dried in an oven, and given in large doses, it oppresses the stomach, occasioning nausea, vomiting, colic, and liquid evacuations; destroys the appetite, and injures the digestive powers; these effects being accompanied by a sense of weight in the head, vertigo, headache, and general torpor of the system. Under these circumstances, he thinks it not difficult to understand, that the connection between the fœtus and the uterus may be modified, and that abortion may ensue. (See the author's *New Remedies*, 3d edit. p. 433, Philad. 1841.) But although, as elsewhere shown, ergot is capable of producing acro-narcotic effects, their supervention is not desired by those, who regard it to be possessed of peculiar powers by which it causes contraction of the uterine fibres of the parturient female, and who administer it with that view. When given in appropriate doses, the parturient efforts become more forcible, constant, and almost unremitting; but there is no bodily disorder.

It has been very freely administered in this country, as well as in others, and it can scarcely be doubted, that although, in many cases, the uterine efforts might have returned, and probably did return, independently of it,—in the remainder the ergot must have exerted a special action on that viscus. From the results, therefore, of such cases, we seem to be compelled to admit, that ergot is possessed of ecbolic properties by which it acts upon the *parturient* uterus; but that it is capable of producing any effect upon the unimpregnated organ, or upon the impregnated at any time except when parturition has commenced, is denied by most observers. Recent experiments, indeed, exhibit the singular fact, that it appears to have the power of prolonging gestation in the guinea-pig and rabbit, when administered for a considerable period. (*New Remedies,* edit. cit., p. 436.)

The cases, in which ergot may be given with propriety, are those in which there is insufficiency of uterine effort, either in force or frequency, or both,—when the labour is somewhat advanced, and the os uteri moderately dilated; and when there is no mechanical obstacle to delivery, owing to deformity of the pelvis, rigidity of the os uteri, or preternatural presentation. It should, likewise, be used with more caution in first pregnancies. It is chiefly employed to increase the expulsive efforts in lingering labours,—to hasten delivery on the occurrence of alarming symptoms; to expedite the expulsion of the placenta, when the uterine efforts fail; to facilitate the discharge of clots, hydatids, &c.; to restrain uterine hemorrhage, especially when occurring in the puerperal or gravid state; to facilitate abortion, when it has once commenced, and it has been strongly recommended for the prevention of uterine hemorrhage. In all these cases, the good effects result from the specific action of the drug on the uterus in action.

It has been an objection, often urged against ergot, that the number of still-born has been augmented since its introduction; and that observation has shown, that whenever it is given to expedite delivery, more or less danger always accrues to the offspring, either by the induction of asphyxia, or of positive death, owing to the violence of the uterine contractions, or to its deleterious agency on the fœtus. It would not seem, however, that when it is prudently administered, there is sufficient reason for the belief, that it is injurious to the child.

It has been already remarked, that ergot exerts its properties on the uterus in action. Such is the general opinion; but there are some who think, that it is capable of originating uterine action, and of inducing premature labour at any period of utero-gestation; whilst others are disposed to think, that the ecbolic properties of the drug are not exerted upon the impregnated uterus at an early period of utero-gestation; but that at a certain stage of development, the uterine fibres are capable of being excited by it, so as to expel the fœtus. It would be strange, however, were its agency to be thus restricted.

A few cases of apparently good effects in amenorrhœa have been published; few, however, if any, believe it to be possessed of emmenagogue virtues.

Ergot may be given in the form of the fresh powder, in the dose of ten to twenty grains in sugared water, and be repeated every twenty minutes, until the effect upon the uterus is elicited. Von Busch found the best results when it was given in the dose of ten grains every ten or fifteen minutes. In one case, it was requisite to repeat it eight times; in four cases, six times; in twelve, five; in thirty-three, four; and in the remainder of one hundred and seventy-five cases, three and less; the smallest quantity exhibited was a single dose of ten grains.

In regard to the most advisable forms of preparation of the ergot, such a difference of sentiment exists as to throw obscurity on the subject. Dr. Wright—it has been seen—regards the fixed oil, left after the evaporation of ether, in which ergot has been digested, to be the active matter; and he states, as the result of positive experiment, that it has the same effect in inducing powerful uterine contractions as ergot itself; for which purpose, it is given in the dose of twenty to fifty drops, in tea, weak spirit and water, some aromatic water, or made into an emulsion with mucilage and syrup. This would seem to be the most advisable form of exhibition, inasmuch as the oil retains its properties for several years, if kept in well closed bottles excluded from light.

Frequently, however, ergot is given, by preference, in infusion; but it is not easy to see, how the fixed oil can be taken up by hot water. Professor Hooker, of New Haven, who is of opinion that the parturient and the narcotic properties may be separated, recommends the clear infusion, which possesses, he conceives, the former property only. The powder, of course, must contain both. Dr. Hooker found, that when a quantity of pulverized ergot was macerated for several days in sulphuric ether, and the liquid was evaporated in a glass vessel, until it no longer afforded the smell of ether, there remained, at the bottom of the vessel, a small quantity of thick heavy oil, resembling, in appearance, fish oil; above this was a lighter oil, much more abundant than the former, of a light reddish-brown colour, and of a sweetish nauseous taste. This light oil was found to be possessed of decidedly narcotic properties; and similar effects resulted from its employment, in some experiments made with it at the suggestion of the author by Dr. McKee, of South Carolina, at the time resident physician in the Philadelphia Hospital.

On the other hand, Mr. Lever prepared an ethereal tincture of ergot, by digesting four ounces of it in four fluid ounces of ether, for seven days. This was poured off, evaporated to dryness, and the residue again dissolved in two fluid ounces of ether: of this solution, from ♏xv to ♏xxx, were given for a dose. It was found to act powerfully on the uterus as a parturient; and Mr. Lever remarks, that whilst all the other preparations of ergot not unfrequently induce acro-narcosis, he has not once observed those effects from the use of the *ethereal solution of ergot*,—and he therefore thinks, that the acro-narcosis is caused by some constituent of the drug, which ether does not dissolve,—a view, which is wholly irreconcilable with the results of Professor

Hooker's observations. The latter gentleman, in his experiments, employed a lighter portion of the oil of ergot of Dr. Wright: Mr. Lever's preparation was nothing more than a solution of the oil in ether.

When the infusion is employed, it may be made of one drachm of *ergot* to four ounces of *water*—one-third being taken for a dose. When, however, the object is to induce premature labour, much larger doses have been necessary. It has been given until the patient took in one case six drachms, and in another twelve, of the medicine; half a drachm being taken every three or four hours. (*Paterson, F. Ramsbotham.*)

As the active properties appear to reside in fixed oil, the alcoholic tincture ought to be an objectionable preparation; and so it has been regarded.

Occasionally, ergot is given in decoction; one drachm of the *ergot* bruised being boiled in six ounces of *water* for ten minutes in a lightly covered vessel, and strained. The dose is one third. —(For different forms of preparation, see the author's *New Remedies,* edit. cit. p. 443.)

VINUM ER'GOTÆ, WINE OF ERGOT. (*Ergot.* contus. ℥ij; *Vini.* Oj.) This is the only officinal preparation of Ergot in the Pharmacopœia of the United States. The dose may be f. ʒj—f. ʒij.

2. SODÆ BORAS.—BORATE OF SODA.

Many of the German writers ascribe to borax a specific influence over the uterus; by which it is supposed to favour the catamenial secretion, the pains of parturition, and the lochial discharge, when their failure is dependent upon inactivity of the organ. (Schroff, *Taschenbuch der Arzneimittellehre,* u. s. w. s. 108.)

It has been recommended strongly by a recent English writer (*Copland*) in cases of abortion. "When the embryo only," he remarks—"is expelled, the appendages being still retained, or when the hemorrhage is great, the entire ovum still remaining in the uterus, the ergot of rye will often prove of inestimable service; and when given in the form of decoction with as much borax as will dissolve, will seldom disappoint our expectations." As it is prescribed, however, by Dr. Copland, along with an unquestioned parturient, doubts may be entertained in regard to its agency in these cases. Of its effects, the author can say nothing from his own experience. It has been advised by one practitioner (*Dr. D. Stahl,* of Indiana,) in dysmenorrhœa occurring in plethoric individuals after blood-letting had been premised. The dose was nine grains every two hours in flaxseed tea, given for two days before the expected recurrence of the catamenia.

SECTION VI.

AGENTS THAT AFFECT VARIOUS ORGANS.

I. EXCITANTS.

SYNON. *Stimulantia.*

IRRITATION, NOT DEBILITY, THE GREAT LETHIFEROUS AGENT—CAUSES OF DEATH IN CASES OF EXTENSIVE ABSCESS, PHTHISIS PULMONALIS, &C. DEBILITY IN ONE ORGAN MAY SUGGEST IRRITATION IN ANOTHER—CASES OF REALLY DIMINISHED ACTION—DIVISION OF EXCITANTS—DEFINITION OF EXCITANTS—CARMINATIVES—CHIEFLY DERIVED FROM THE VEGETABLE KINGDOM—SIMPLE DIRECT ACTION OF EXCITANTS—GENERAL EFFECT OF EXCITANTS—EXCITEMENT AND COLLAPSE DEFINED—EXCITANTS ACT ALSO AS REVULSIVES—THERAPEUTICAL APPLICATION OF EXCITANTS—IN GASTRIC AND INTESTINAL AFFECTIONS—IN FEVERS—IN INFLAMMATORY DISEASES—CATARRHS—IN THE NEUROSES, HYSTERIA, EPILEPSY, PARALYSIS—IN TOPICAL INFLAMMATION—MENTAL EXCITANTS—SPECIAL EXCITANTS.

ALTHOUGH the doctrine—that debility is the cause of almost every diseased action—is now nearly exploded, there can be no doubt, that, owing to morbific agencies, the vital manifestations of a part may be enfeebled, and that a plan of treatment, which will arouse them to greater activity, may occasionally be required. Even so late as the time of Cullen it was maintained, that the great indication to be followed by the therapeutist, in cases of fever, was to obviate the tendency to debility and death. A better attention to physiology and pathology has shown that the great lethiferous agent, in such cases, is irritation, and that death often results from this cause, where its agency was at one time altogether unsuspected.

It has often been observed, that where large collections of matter have formed, and been discharged by the surgeon, febrile irritation of the most fatal kind has rapidly supervened, yet little or none of this irritation was present before the matter was evacuated. It was accordingly supposed, at one time, by every surgeon, that the irritative fever was the result of debility induced by its discharge. It is obvious, however, that in such case, from the time that the pus is secreted, it is as extraneous to the vital operations as after its discharge. The removal of that which is already secreted, cannot add to the existing debility. The cause of the hectic fever, set up in such cases, and present to some extent, from the moment that extensive suppuration begins to be established, reposes on the circumstance, that when once the pus is discharged, a recuperative effort takes place in the vessels of nutrition of the inner paries of the cavity; and the severe irritative fever, which follows, is owing to the constitution sympathizing with the excited capillaries to such an extent, that the system often sinks under the effects of its own reparatory exertions.

No one, at the present time, conceives, that the consumptive are worn away by the discharge, that takes place from the substance of the lungs. Hectic fever occurs in phthisis pulmonalis, as in every other case where extensive mischief exists, and great recuperative effort has to be exerted; and, under the irritation of this fever, the spark is gradually extinguished.

It is not in these cases only, that the prevalent doctrine of debility has been exploded. The practitioner, when he observes signs of debility in an organ or in the system generally, inquires, whether the vitality of other organs may not be exalted, and whether there may not be a source of irritation existing somewhere, which, by detracting from the vital manifestations in other parts, may be the cause of the local or general evidences of asthenia or debility. A strong man, in a state of health, may be attacked with general fever, accompanied by great languor and lassitude, with every sign, indeed, of apparent debility—yet a very slight examination may exhibit, that an undue quantity or improper quality of diet is exciting gastric irritation, which is the source of all the asthenic phenomena. Again, a man, in a condition of rude health, may be exposed to febrific miasmata; and, in due time, without much previous indisposition, may exhibit appearances of the greatest debility; and, although a short time before he might have been able to raise pounds, he may be now scarcely able to raise as many ounces. Yet, it is impossible to presume, that such debility is real; it is rather dependent upon the excessive irritation in certain parts of the organism detracting from the vital forces in others; and the important point for the therapeutist is,—to direct his attention to the removal of this irritation, after which the effects—the asthenic feelings and symptoms—may cease also. Accordingly, at the present day, no practitioner, at the commencement of a febrile condition, is deterred from the use of evacuants by symptoms of languor and lassitude,—experience and reflection having sufficiently instructed him, that the proper employment of such agents is adapted to equalize the vital manifestations, by reducing the inordinate action existing in some part of the organism, and thus equalizing the circulatory functions of the whole.

Even in cases of cachexia, where general debility appears to be unequivocally manifested, some lurking mischief is generally present; and when, in such cases, we find a change of the atmospheric, and other influences surrounding the patient, productive of signal benefit, it is owing to the equalizing influence of change of air, society, and scenery, which detracts from the local mischief, and exhibits its genial effects over every part of the frame; hence, the wonderful recoveries we annually witness in chronic diseases from a visit to our trans-Alleghany or other watering places;—the waters having often had no agency in the cure,—frequently, indeed, not having been used at all. Still, there are conditions of the frame, in which the vital activity is diminished far below the healthy standard; where the vascular system is in a state of anæmia, the blood less rich in globules and nutritive pabulum; and the solids of loose coherence, so that the blood escapes through them with facility, or they rupture on the slightest mechanical violence,—or when, after violent exaltation of the vital forces, a corresponding depression or state of collapse supervenes. In such cases, excitants, especially those of a more permanent character may be imperatively demanded.

In the great division of excitants, those agents are usually included whose excitant action is *local* or *general;* in other words, is exerted upon some particular organ or tissue, affecting it by preference, and comprising the class of *local stimulants* of Murray,—the *local excitants* of others, whose operation is that of simple stimulation on the tissue with which they are placed in immediate contact, extending or not to the general system, so as to produce augmented action of the nervous and sanguiferous systems.

The classes of medicinal agents, which act as general stimulants, are chiefly—*Excitants, Tonics,* and *Astringents;* those that are usually ranked as *local* stimulants are—*Emetics, Cathartics, Emmenagogues, Parturients, Diaphoretics, Errhines, Sialogogues, Diuretics* and *Expectorants,* of all of which the author has treated separately.

Excitants, Stimulants, or *Incitants,* may be defined—agents that increase the organic actions by impressing the contractility of the part to which they are applied;—the excitation, thus induced, being extended, or not, to the rest of the system.

The organ, whose contractility is generally selected to be first impressed, when excitants are administered, is the stomach, although the skin and mucous membranes—especially the Schneiderian membrane, and the lining membrane of the rectum—are at times chosen. The extensive sympathy, which exists between the stomach and the rest of the system—particularly the nervous and sanguiferous portions—renders it best adapted for the receipt of the impression, which excitants are capable of producing *directly.*

In the classification of Murray, which is closely followed by Dr. Paris, there is no division of excitants. The latter writer has, indeed, a class of *Aromatics*, which he defines—"Substances of a fragrant smell, which produce upon the organs of taste a peculiar sensation of warmth and pungency, and occasion, when swallowed, a corresponding impulse upon the stomach, which is rapidly communicated to the remote parts of the body;" but this definition is obviously insufficient to embrace the whole class of excitants, as several agents of an exciting character,—caloric and electricity, for example,—can in no wise be regarded as aromatics. Aromatics can be looked upon only as a subdivision of excitants, whose *modus operandi* essentially resembles that of the whole class.

Of old, aromatics were employed chiefly as *carminatives*—a subdivision not now admitted, although we still retain the term, which—as before remarked—is derived from *carmen*, 'a verse-charm,' and was introduced at a period of superstition, when magic and incantations were had recourse to, and when physiology and pathology scarcely existed.

Carminatives were employed to expel flatus from the stomach and intestines, and they afford a good example of excitants, that produce their effect simply on the parts with which they come into immediate contact, or, at least, without exciting the general system. When flatus accumulates to any extent in the alimentary canal, the muscular fibres become so far distended that atony is produced, and they are incapable of acting with sufficient energy to expel the air, or to diffuse it through the tube; hence, the pain, which accompanies such over-distension in flatulent colic. But if, in this case, an aromatic or carminative be administered, the excitement produced by it in the mucous membrane, with which it comes in contact, is extended, by contiguous sympathy, to the muscular coat, which is aroused to greater contraction, and, in this way, the flatus is compressed; a part may escape through the cardiac orifice of the stomach, if that organ have been the seat of the affection, or it may descend into the lower intestines. The older writers, not being able to comprehend how the sudden relief was accomplished in such cases, asserted its operation to be *carminative*, or like that of a charm.

Most excitants are derived from the vegetable kingdom, and the property, on which their virtues are dependent, is usually volatile oil, or some analogous principle; hence the action, and form of administration, of vegetable excitants afford but little difficulty to the student. In the generality, indeed, the active principle—the volatile oil—is separated by distillation, and is administered in this form, so that the plants and their products, whence the oil has been derived, are but little used in therapeutics. This is the case with *carraway*, *aniseed*, *lavender*, the *mints*, *cinnamon*, *cloves*, *nutmeg*, &c. In other cases, the oil is rarely separated, as in *calamus*, *ginger*, wood of *sassafras*, &c. Here, the sole care consists in not applying heat to such an extent as to drive off the volatile oil, and accordingly, those agents are either given in substance, or infusion,—not in decoction or extract.

The excitants, that are derived from the inorganic kingdom, exert their agency in various ways. They have, indeed, no principle in common to which their operation can be referred. (*A. T. Thomson.*)

The case of flatulent colic is one in which the simple direct action of excitants is desired; and it is manifest, that similar principles would lead to their adoption in affections of the stomach dependent upon debility of its muscular coat,—as indicated by flatulence, sense of distension, &c., unaccompanied by inflammatory or other irritation in the lining membrane. Accordingly, it is, and has been, a common custom, with all nations, to use some alcoholic excitant after food difficult of digestion has been taken.

That, which applies to food difficult of digestion, applies likewise to the cases above referred to, in which the digestive powers are enfeebled; and to those especially where the defect lies in want of due contractility in the muscular fibres of the stomach and small intestines,—particularly of the former. When hot water or dilute alcohol—pure, or medicated—is taken into the stomach, it produces two effects. It stimulates the mucous membrane to an increased secretion of those fluids, that are inservient to digestion; and, by contiguous sympathy, the muscular fibres are aroused to greater activity, so that the contraction of the organ upon its contents is more marked;—hence the eructation, which follows the use of these excitants, and the absence of uneasy feelings of distension, which might have been experienced had they been withheld. Alcoholic liquors, moreover, have a chemical operation, not possessed by ordinary excitants. They coagulate the albuminous matters in the stomach, and may thus aid in giving the contents of the organ a texture better adapted for the accomplishment of digestion. (See the author's *Elements of Hygiène*, p. 324, Philad. 1835.) But occasion will be afforded to refer to the particular examples of local stimulation, when the consideration of the therapeutical application of excitants occurs. At present, it is necessary to inquire into the general effects produced by excitants, when their action is not restricted to the part with which they come in contact, and when the object of the practitioner is to exhibit them so as to affect the whole system.

The nervous susceptibility is, in such case, greatly augmented; the action of the moving fibres increased; the pulse rendered more frequent and forcible, and the function of calorification excited,—if the quantity of the agent be great, or its powers considerable. These effects must obviously require a larger dose of the excitant than where the object of the practitioner is merely to produce a local stimulation. The very different effects of excitants, according to the quantity administered, is, indeed, a circumstance of great interest to the practitioner. A small dose may stimulate the lining membrane of the stomach to a greater secretion of the digestive fluids, and the muscular fibres to greater activity, so that the food may be digested more readily and rapidly; chylosis be facilitated; the blood move with greater rapidity in the vessels; and the various secretions, and excretions be more readily effected; but, if the dose be carried far beyond this, irritation may be excited in the part with which the excitant comes in contact, or true inflammation may result, so that a general febrile condition may be induced, under which many of the functions enumerated, instead of being facilitated, may be retarded—especially the secretions and excretions—which are never properly accomplished during fever. These, however, are the results of too strong a dose: the quantity of excitants, by careful attention, may be so tempered, that nothing but a salutary excitation may supervene; and this constitutes one of the great difficulties in the proper therapeutical employment of this class of agents.

There is another important consequence of stimulating the whole, or any part of the organism beyond the due point—namely,—that a corresponding state of depression succeeds; so that,—after violent excitation,—collapse, or almost total prostration may ensue. This kind of compensation of action appears to exist to a great extent in the organism. If any organ be greatly over-excited, other organs are often observed to be struck with debility, and hence it is, as we have seen, that the judicious pathologist—when he observes want of action, or apparent atony, in one organ—carefully investigates, whether the deficiency of vital manifestation may not be compensated by inordinate action elsewhere.

This supervention of collapse on over-excitement renders it a matter of moment to be able to determine what are the healthy manifestations, by which the evidences of exaltation or diminution of the vital forces may be determined. This, however, is not an easy matter, and the difficulty is greater in some individuals than in others. No two persons have the functions of circulation, innervation and calorification alike. A modern writer, (*Dr. A. T. Thomson*) has attempted a solution of the question, by affirming, that "*excitement* implies every state of the nervous system in which the energy of the brain is greater than that, which, in the waking state of a healthy man, is exactly adequate to the ordinary functions of the system: *Collapse* that state in which the cerebral energy is so much diminished as to suspend the exercise of the functions of sense and volition—a state of defective activity of the brain, similar to that which causes sleep, only in an augmented degree. There can be no doubt, that a certain supply of blood to the brain is essential for the support and continuance of its functions; too great an increase of the momentum produces *excitement;* a diminished afflux, on the contrary, within certain limits, or an exhaustion of the moving powers from previous over-exertion, is productive of *collapse.*" But these definitions do not solve the difficulty. The constitutions of individuals differ so much, that we cannot easily determine what are the healthy manifestations in any particular person. Whenever, therefore, excitants appear to be indicated in disease, the therapeutist has to be cautious not to carry the excitation too far, lest the vital energies should be impaired or worn out; and, for the like reason, it becomes important, when once the use of excitants has been commenced, that they should be withdrawn with caution, lest a state of collapse, or of diminished action, should succeed, proportionate to the preceding stimulation. This is especially demanded in protracted fevers, in which excitants may still have been employed with propriety.

The state of collapse, referred to above as supervening on over-excitement, differs essentially from that, which attends spasmodic cholera. In this fatal malady, owing to the excited state of the lining membrane of the intestines, the watery portions of the blood are largely exhaled, and passed off in the evacuations, until ultimately the blood becomes too thick to circulate in the extreme vessels; the nervous system does not receive its due supply of blood possessing the requisite properties, and even the central organ of the circulation, and the whole circulatory apparatus, have their functions impaired, and ultimately annihilated. But this state of collapse is not the immediate consequence of previous general excitement.

It will be seen hereafter, that all tonics are excitants; but that the *former* do not stimulate beyond the healthy standard, and are more permanent in their action, whilst the *latter* are always employed to excite more or less beyond the healthy degree, and are more transient in their operation, although their effects may be more speedily exerted.

A valuable mode, in which some of the agents belonging to this class of medicines exert their efficacy, is by revulsion. The whole class of counter-irritants and epispastics are properly excitants;—but their intimate examination will be entered upon under a distinct head. (See REVELLENTS.) Mercury and caloric are also employed with this view in disease; but the consideration of the *modus operandi* of the former, when carried so far as to affect the system, will also fall in another place. (See EUTROPHICS.)

The catalogue of the Materia Medica furnishes us with a liberal choice of excitants; yet, so large a portion of them essentially resemble each other in their properties, that the list might be much diminished without any disadvantage to science or humanity. There is scarcely an aromatic vegetable, the essential oil of which has not been admitted into the pharmacopœias of Europe, or of this country, yet almost any one of them might be selected as a fit representative of the whole.

Therapeutical Application of Excitants.

In gastric affections.—In the therapeutical application of the class of excitants we have always to reflect, whether the indication be simply to effect a local stimulation, or to have the excitation extended to the general system;—whether, in other words, it be merely a morbid condition of the digestive function, that has to be combated, or one involving the great systems—nervous, vascular or secretory.

Where the mischief is purely gastric, and dependent apparently on want of tone in the muscular coat of the stomach, or in the organ generally, the diffusible excitants are chosen, if the uneasiness be urgent—as where *flatus* is present. Ether, alcoholic liquors, hot water, the essential oils, &c., may be employed with this view, but any stimulation, thus induced, can only be momentary; the cause of the uneasy symptoms may still persist, and demand a treatment more permanent in its influence. Correct pathology may suggest, that, in these cases, recourse should be had to a combination of tonics and excitants, in order that, whilst the latter palliates the uneasy feelings, the former may radically remove the want of tone which gave origin to them. Accordingly, one of the bitter roots or barks is usually given in infusion, along with some aromatic;—the bitter principle of the root or bark exerting its tonic influence, whilst the essential oil of the aromatic acts as an excitant. Care, however, must be taken to discover, whether the symptoms are really produced by atony, for there is a variety of *dyspepsia*—indicated, at times, by pain of the epigastrium on pressure; by uneasiness, when hot or cold fluids are taken,—by dryness and redness of the tongue; dryness and heat of skin, with sometimes quickness of pulse,—which consists, as the symptoms sufficiently indicate, in an irritated or inflamed condition of the gastro-enteric mucous membrane, and where, of course, the stimulant plan of treatment would be injurious. This very condition of mucous membrane may, indeed, be induced by the incautious use of excitants. It has been already remarked, that excitation is followed by corresponding depression; and that excitants, in an over dose, exalt inordinately the vital energies of the part with which they come in contact, so that if this course be persevered in, the irregular condition of the mucous surface—as to alternate excitation and depression—can scarcely fail to eventuate in irritation, if not in true inflammation; hence it is, that excitants alone are rarely used in affections of the digestive tube, unless for the removal of sudden attacks of disease, as of *flatulent colic*, especially in children, when a few drops of any essential oil will usually remove the mischief, in the manner previously explained.

In persons of the gouty diathesis, and occasionally in others, violent attacks of a spasmodic character affect the stomach, causing the most excruciating pain, aggravated at intervals, but with no signs whatever of inflammatory excitement. In such cases, a new action must be produced in the nerves of the organ, by the administration of the most diffusible excitants—combined, or not, with narcotics—until relief is procured. The latter class of remedies affords us the most efficacious agents in these affections; accordingly, more trust is reposed in them. Ginger, capsicum, ammonia, ether, &c., are the excitants usually had recourse to in these cases; and the effect of internal agents is often aided by the application of stimulants to the epigastric region, which operate by exciting a new action in the nerves with which they are placed in direct contact, and thus detracting from the erethism in the nerves distributed to the stomach. This kind of revulsive impression or of new action is, indeed, a main cause of the good effects derived from the administration of the pure antispasmodics in diseases of a spasmodic nature.

In cases of great *irritability of stomach*, especially in the vomiting of pregnant females, which sometimes proceeds to a distressing extent, a genial effect is produced on the stomach, by the new action, which gentle excitants occasion. Even the mild stimulation, afforded by carbonic acid contained in soda water, or extricated during the effervescence produced by the union of tartaric acid and carbonate of soda, often affords marked relief; and, in the worst cases, the exhibition of diffusible excitants, with the application of a sinapism or other excitant externally, hardly fails to palliate—if not to radically remove—the irritability of the organ, where it is only functionally deranged; for, it need scarcely be said, that where organic mischief exists; where inflammation, common or specific, or its consequences, are present, and the cause of the vomiting, these agents will not only fail in affording relief, but may be positively noxious, at least when exhibited internally. In such cases, the efforts of the practitioner are restricted to the use of narcotics as palliatives, and to the external application of excitants as counter-irritants.

In constipation.—In like manner, in cases of constipation, unattended with inflammation, and, on the contrary, accompanied by great torpor of the digestive function, the addition of an aromatic excitant to the cathartic is beneficial, by stimulating the muscular coat through the mucous coat; whilst it may act as a corrigent to the cathartic, if the latter have any griping quality, by aiding it in its passage through the intestinal canal, in the mode already described.

In fever.—It need scarcely be said, that excitants must be employed with extreme caution in fever. At one time—as already remarked—the great indication, in these affections, was supposed to be,—to obviate the tendency to debility and death, and, accordingly, antiphlogistics, especially of the depleting kind, were used with great hesitation, and every thing was done to husband the strength so as to permit the patient to bear up in the last stages. A better system fortunately now prevails, and it is universally admitted, that few, if any, die from febrile debility, and that the fatal influence is seated in the over-irritation of some tissue or tissues, under which the patient gradually succumbs. The efforts of the practitioner are, therefore, properly directed to the prevention of irregular action in organs, and to the removal of irritation, or inflammation, wherever existent. Under this philosophical treatment of fever, excitants are, of course, never employed during the early periods, and it is only when the powers of life begin to flag, that a question can arise as to the propriety of their adoption. Even in the very lowest stages of the worst grades of typhus, this question is not always very easily settled. There is generally more or less local irritation present—often in the lining membrane of the stomach and intestines—and many of the signs of debility are dependent upon the depressing influence exerted on other functions by the predominance of irritation.

This depressing influence on the sanguiferous system is often singularly evinced in diseases of the intestinal canal, especially such as affect the lining membrane; and a striking example of it is seen in cholera. The author attended with his friend, Professor Smith, of the University of Maryland, one of the students of the University, who, after having been present at the lecture of the Professor of Obstetrics, in the evening, was attacked with violent vomiting, but without any abdominal or other uneasiness. On the following morning, there was some slight tenderness on pressure, and the vomiting persisted. He was cupped over the abdomen, although neither the state of the pulse, of the skin, nor the other symptoms appeared to indicate inflammatory action. During the day, he gradually sank, and expired the same evening. On examining the body, a portion of the ileum was found contracted for the space of several inches, but this contraction must have formed gradually. The lining membrane exhibited but slight signs of irritation. There is something, indeed, extremely unaccountable in these cases. The peristole of the digestive tube is but indirectly influenced by the brain and spinal marrow. The heart itself is equally abstracted from direct cerebro-spinal influence, and, indeed, from almost all nervous influence; yet, in enteritis, the whole circulatory apparatus is oppressed, as it were; and this oppression, if not removed, rapidly terminates in depression; whilst, in the comparatively harmless disease—*amygdalitis*, or inflammatory sore throat—the action of the heart is inordinately excited, and the whole vascular system thrown into violent turmoil.

It is generally considered proper to have recourse to excitants in fever, when the pulse and the beat of the heart become feeble and fluttering; the tongue moist perhaps, but with a dark fur; the teeth covered with sordes; the skin bathed in a cold, clammy sweat; or, if hot and dry, with concomitant symptoms of debility; sinking down in the bed, and low muttering delirium; the tongue tremulous, and protruded with difficulty,—indicating great debility of the nervous system; petechiæ or vibices, produced by transudation of blood, rendered thin by disease, through the loosened parietes of vessels, &c., &c. But it is impossible to lay down any positive rules for the guidance of the practitioner, and it is better, that he should even allow the signs of prostration to become marked, before he passes to the too early use—as it may prove to have been—of excitants. Dr. Rush, as before remarked, considered, that there was a period in fevers, at which blisters might be applied as excitants with great advantage; but, if used before this period, they would be productive of mischief. It is, however, impossible to fix upon any such point with accuracy; and in this, indeed, the main difficulty rests. If it could be decided on by any specific signs, it would be but necessary to apply the antiphlogistic, or the excitant medication accordingly. Vesicants are, however, by no means the best agents to be employed as excitants. In the low conditions of the frame, in which they are conceived to be indicated, the discharge of a quantity of the serous part of the blood cannot fail to add to the debility more than the excitant property can detract from it; they produce, moreover, excessive irritation, and are, withal, transient in their operation. A more permanent excitant is, therefore, better adapted to these cases; and internal stimulants—as wine—are preferred, the quantity being carefully regulated so as not to excite beyond the due degree. Under another head, it will be seen, that epispastics may be employed with decided advantage in fever, but not on the principle of inducing general excitation. (See REVELLENTS.)

Whenever excitants are esteemed necessary in fever, the fact, before adverted to, must be borne in mind, that their operation is apt to be followed by corresponding depression. They should be administered, consequently, so frequently, that the depression has not time to intervene, care being taken, that they are not given in such doses as to excite beyond the proper point; and, if their operation be salutary, they will be found to detract from, rather than add to, the febrile irritation; if, however, the febrile symptoms should be manifestly increased under their administration, they must be discontinued—but discontinued gradually—for the reasons mentioned.

These general views will afford some guidance in the use of excitants in febrile complaints in general. The author has already said, that in such affections they are but little needed, and that they must, in all cases, be employed with a wise caution. The case, indeed, must be sufficiently hopeless, in which the elasticity of the frame is incapable of restoring it to its wonted energies without their agency; and very often—too often—when they are determined upon, they occasion, at the most, a slight flickering of the flame prior to its total extinction. It is a common argument in favour of the administration of excitants, that it is the duty of the practitioner to support the patient as long as life lasts; and the belief is almost universal, that existence can be prolonged by the full use of stimulants; but this appears to the author to be questionable. There is, in these extreme cases, but a small amount of excitability remaining in the organism; and this, it appears to him, must be sooner exhausted by excitants; so that the patient may absolutely die more speedily under the use of agents administered with the view of protracting his existence.

In inflammation.—What has been said of the impropriety of excitants in febrile affections applies equally to inflammatory diseases. They are, obviously, positively improper in all acute inflammations of internal organs of every kind. This, at least, is a general rule to which we ought to be cautious of admitting exceptions. Some surgeons are in the habit of administering copaiba and cubebs during the inflammatory periods of gonorrhœa virulenta, and, they assert, with full success. In the experience of others, these agents have not been as successful, or as innocuous. Something may depend upon the peculiarity of the inflammation of mucous membranes to which the author has referred, and will have, again and again, to advert. His experience in these cases, and it has not been limited, leads him to treat the disease by antiphlogistics, especially in its early stages, and he has always found the plan successful. There is, however, a condition in these *catarrhs*,—as the inflammations of the mucous membranes in general are often designated by the French pathologists,—in which excitants may be administered with signal advantage. It is when the violence of the inflammation has subsided, and when a discharge is still kept up, owing to the atonic or asthenic condition of the over-distended extreme vessels,—hence, in the state of chronic inflammation of the intestines, constituting the latter stages of acute dysentery, or in the after stages of diarrhœa, that excitants may occasionally be used with benefit; but here recourse is had generally to those that belong to another class of medicinal agents—astringents. In bronchitis, too, especially in the variety, which affects old people, and which was, at one time, called *catarrhus senilis*, excitants are employed with advantage, especially such as are inhaled, and, in this way, come in contact with the vessels affected.

In hypertrophy of the heart.—Where hypertrophy of the heart exists—as indicated by strong impulse, diminished sound, dulness on percussion, and other signs afforded by auscultation—excitants are, of course, improper. Modern pathology has shown, that where such a condition of the heart is present, the tendency is laid to hyperæmia in the brain; and, hence, vertigo, depravation of vision, cephalalgia, &c., are its frequent attendants. There are, however, no morbid states of the heart, and none of the blood-vessels,—except such as are indicated by over-distension of the subcutaneous veins, and but few cases of these,—in which excitants can be employed with propriety.

In the neuroses.—In some of the neuroses, excitants are demanded, but they must be used with due caution.

Delirium tremens, in its severe forms, has been considered by some to imperiously demand the employment of powerful alcoholic excitants; but, as the author has shown hereafter, they are by no means indispensable, and the disease admits of cure without the use of any of them. (See the article *Alcohol*, under SPECIAL EXCITANTS.)

In *hysteria*, excitants are frequently administered for the purpose of exciting a new impression. The disease is manifestly neuropathic, and is usually dependent upon great excitability in the cerebro-spinal and nervous system. The object of the practitioner is to break in upon this morbid irregularity of action by making a powerful impression elsewhere. (See ANTISPASMODICS.)

In *epilepsy*, *chorea*, *tetanus*, *neuralgia*, &c., we have but rarely recourse to excitants, because the nature of the diseased action requires a more permanent medication, which tonics are better able to effect. There may, indeed, be cases,—as in every other class of diseases, in which they are generally to be avoided—that may require their administration; but all this must be decided by a reference to general principles.

In *Paralysis.*—Perhaps there is no neuropathic affection, in which the whole train of symptoms would appear to suggest the administration of excitants more than paralysis. The name, (from παραλυω, 'I relax,') and the symptoms convey the idea of loss of power, and it might appear that in all cases, attempts should be made to restore it by the use of excitants. They cannot always, however, be used with perfect safety. Paralysis is often, if not usually, induced by a hyperæmic condition of the encephalon, or of some portion of the cerebro-spinal axis; and although this state of hyperæmia may disappear, and the *resolutio nervorum*—as it was once called—continue; excitants, if incautiously exhibited, may endanger the recurrence of the hyperæmia, and thus give occasion to another attack of the disease. Of course, the nearer to the period of the paralytic seizure, the greater the mischief likely to ensue from the injudicious employment of this system of medication.

Yet although the incautious use of excitants has to be avoided in cases of paralysis, their careful administration is occasionally productive of much benefit,—both in *hemiplegia*, *paraplegia*, and in cases of *partial palsy*, such as that caused by the poison of lead, for example. The whole class of epispastics is here much employed. Electricity and galvanism, acupuncturation, moxa, &c., are applied to rouse the paralyzed nerves to action; friction, too, is recommended, along with the internal use of excitants,—such as affect the cerebro-spinal system more especially. With this view, nux vomica, and especially its active principle—strychnia—has been exhibited, and in a few cases apparently with partial success. It has been shown, that when this energetic agent is taken for a due time, and in an appropriate dose, it occasions tetanic convulsions in the muscles to which the paralyzed nerves are distributed, and, consequently, seems well adapted for exciting a salutary stimulation in these cases, (p. 387.) Too often, however, the cause of paralysis, seated as it is in the cerebro-spinal axis, baffles every effort for its removal, and is far beyond the reach of excitants—either internal or external. It ought not, indeed, to be expected, that the latter could have much influence. Friction, so often employed, blisters and other external irritants can only exert their primary action on the parts secondarily affected. In this way, the encephalon, it is true, may receive the excitant irradiations, but the effect cannot be great, and, accordingly, external excitants are not regarded as efficacious agents in these diseases.

In the paralysis of the seventh pair of nerves distributed to the face, as it is, generally perhaps, local—rarely encephalic—and therefore of comparatively favourable prognosis—the class of excitants may be had recourse to, with much prospect of advantage.

In local inflammation.—In many cases of local inflammation—seated on the surface of the body, and affecting the skin more especially—the application of excitants is often of unequivocal efficacy. It has long been a custom to expose a burnt part to the radiation of heat, or to hot lotions, and the success of the recommendation is often signal. Shakespeare alludes to the practice, and to the fancied law of the economy, in his '*Romeo and Juliet.*'

> "Tut, man! one fire puts out another's burning:
> One pain is lessened by another's anguish;
> Turn giddy and be holp by backward turning;
> One desperate grief cures with another's languish.
> Take then some new infection to thine eye,
> And the rank poison of the old will die."
> *Romeo and Juliet*, ACT I. SCENE II.

In like manner, in *paronychia* or whitlow, especially when superficial, the pain and inflammation are relieved by lotions of hot alcohol or hot vinegar; and we have examples of the same *modus operandi* in the influence of capsicum and other stimulating gargles in *inflammatory sore throat;*—of stimulating applications in *pernio* or *chilblain;* of hot lotions in *mastitis;* of *oil of lemon* dropped upon the inflamed conjunctiva, &c. It has been before shown, that, in the inflammations of the dermoid system—cutaneous or mucous—as a general rule, the over-distended state of the capillary vessel predominates over the excitation of the blood-vessel communicating with it, and that the capillaries are in a state of hyperæmia, which occasions the motion of the blood through them to be retarded, and, at times, absolutely arrested. Anything, consequently, that will stimulate the over-dilated capillaries to resume their wonted calibre, may remove the cause of the excited state of the vessels communicating with them, and, consequently, put a stop to the inflammation. We may thus account for the good effects of blisters in whitlow, and in cutaneous inflammations. Occasionally, too, excitants are employed to diminish the sensibility of particular nerves,—as in *toothache.* For this purpose, the strongest essential oils,—as the oil of origanum, or the oil of cloves,—are introduced into the hollow of the tooth, so as to come in contact with the exposed nerve.

Friction is an excitant application, which is had recourse to, especially after the use of the cold bath, to excite reaction. It is also employed to modify the action of the vessels of nutrition, to occasion the absorption of effused or secreted matter: but, in this point of view, its effect is eutrophic, and will, therefore, engage attention in another place. (See EUTROPHICS.)

In surgical affections.—In the hands of the surgeon, excitants are valuable agents. He employs them for inducing a new action in *indolent ulcers*, and for exciting the action of the absorbents to take up parts that have been deposited. It is with this view, that white sugar is blown into the eye, in cases of specks of the cornea. (See *Saccharum*, under REVELLENTS.) The same agent has likewise been recommended to be inhaled, finely pulverized, to aid in the disengagement of the adventitious membrane, formed in cases of diphtheritis of the mucous membrane of the trachea. For the like purpose, certain astringents are employed occasionally.

Lastly:—to the class of MENTAL EXCITANTS belong certain emotions, whose effects on the economy are not less marked than those produced by physical agents.

It has been the custom to separate the various emotions into two divisions,—the *exciting* and the *depressing*,—an arrangement which, in some measure, expresses the effects on the system, which they are respectively capable of inducing. There is, however, as has been properly remarked, (*A. T. Thomson*,) a difference amongst excitants in the degree to which they stimulate the different functions. Some excite but little, and their action is more permanent, and not followed by the depression which supervenes on the use of the more powerful. They, consequently, belong rather to the class of *tonics*. The writer, just referred to, places, in the list of mental excitants, *joy* and *impetuosity*,—emotions, which—it will be generally agreed—belong properly to this division of therapeutical agents. There is not a general effect, which follows the administration of physical excitants, that they are not capable of inducing. It is obviously difficult, however, to have recourse to joy as a remedial agent. It has happened, that the communication of glad tidings has had the most salutary effect upon the hypochondriac, and the melancholic; but the remedy is not easy of application, and the effect must be transient. Excessive joy may even arrest the functions of the brain, and there are cases on record, in which death has followed so rapidly on the emotion as to suggest the same *ratio moriendi* as in death from lightning;—the sudden shock to the nervous system being too great for the vital functions to withstand.

Allied to joy is a cheerful disposition,—*hilarity*, and its accompaniment *laughter*. Every therapeutist has observed the aid, which such a disposition affords to the invalid, and the injurious influence of depressing emotions. At the same time, care must be taken not to allow buoyancy of spirits to lead the individual into imprudence, and to indulge in mental excitement to too great a degree. The stimulus, communicated to the whole frame in this way, where there is a tendency to irregularity of nervous or vascular action, is apt to lead to hyperæmia in some organ, and in this way to induce unpleasant consequences. In febrile affections, and in the state of irritability, which occasionally exists for some days after delivery, the excitation, occasioned by exhilarating conversation, and the fatigue thus induced, react injuriously in many cases; and the wise therapeutist is careful to enjoin both mental and corporeal quietude, until the vital functions are more regularly exerted, and less liable to be deranged by excitant or other influences.

When mirth is accompanied with laughter, we have, in addition to the excitant effects, derangements of another kind induced, provided the laughter be immoderate or unduly protracted. Laughing is a convulsive action of the muscles of respiration and of the voice. It consists of a succession of short, sonorous expirations. The air is first inspired, so as to fill the lungs. To this, short interrupted expirations succeed, caused by convulsive contractions of the diaphragm; and, in very violent laughter, the respiratory muscles are thrown into such forcible contraction, that the hands are compelled to be applied to the sides to support them. The convulsive action of the chest interferes with the circulation of the blood through the lungs; that fluid, consequently, stagnates in the upper part of the body, and the face becomes suffused.

From this explanation of the physiology of laughter, it can be understood, how injurious it may be, when immoderately indulged, to those, who are predisposed to apoplexy, of which it may be, in this way, occasionally an exciting cause. It is a symptom, likewise, in hysteria, and, in the hysterical, is apt to induce a paroxysm, if carried to too great a length; but, on the other hand, in cases in which the functions of the abdominal viscera are torpid; where asthenic dyspepsia is present; or constipation, arising from a like cause; or where the secretion from the liver is not properly effected, gentle laughter is a useful agent. It impresses a salutary succussion on those organs; excites them from their condition of torpor; improves chylosis, and the digestive function generally; and is inservient to the due nutrition of every part of the frame. Hence the old proverb—"*laugh and grow fat*"—which, like most proverbs, is in some degree bottomed in reason.

Impetuosity, in which we include rage, or any sudden and intense mental excitation of any kind, acts like joy, which might, indeed, have been considered, with propriety, under the head of impetuosity. All the bad effects, described as likely to be induced by joy, may follow it; and many are the cases of chronic diseases of the heart and lungs, in which a sudden burst of passion has at once closed the earthly career of the sufferer.

We know, that although the heart does not appear to be directly influenced by either the brain or spinal marrow, its irritability is considerably affected by the various emotions, and when these are violent, and the organ is in a morbid condition, the effect on the irritability is so great, that the action of the heart may cease, and there may not be a sufficient degree of reaction for it to resume its functions. Where the valves of the heart have been diseased, the fatal event has occurred at once under the influence of powerful mental excitation.

Such are the chief therapeutical properties of the class of Excitants. The next class, which will be considered, does not differ essentially in intimate operation from them. Tonics are, however, capable of being administered when excitants cannot, without danger of injurious consequences: occasionally, also, they are given with excitants, when the object is to produce more stimulation than pure tonics are capable of effecting.

SPECIAL EXCITANTS.

1. CINNAMO'MUM.—CINNAMON.

Cinnamon is the bark of *Cinnamo'mum Zeylan'icum* and *C. aromat'icum;* Sex. Syst. Enneandria Monogynia; Nat. Ord. Lauraceæ, (*Lindley*,) which are cultivated chiefly in Ceylon and Java, and likewise in the Isle of France, Bourbon, the Cape de Verds, Brazil, Cayenne, several of the West India Islands and Egypt. In the cinnamon gardens of Ceylon, the bark is obtained from the three year old branches, which are lopped off, and peeled,—the peeling being effected by making two opposite—or, when the branch is thick, three or four longitudinal—incisions, and then elevating the bark by introducing the peeling knife beneath it.

By far the greater part of the cinnamon brought to this country is said to be imported from China, which is entered at the custom house as *Cassia*, whilst the same article brought from other sources is said to be almost uniformly entered as *Cinnamon.* By an examination of the treasury returns, from the year 1820 to 1829, it appeared, that the average annual import of this spice was, in round numbers, 652,000 pounds from China; 12000 pounds from England; 9000 pounds from the British East Indies; 3000 pounds from the West Indies, and an insignificant quantity from all other places, with the exception of 12,758 pounds, brought in one year from the Philippines. (*Wood & Bache.*)

It would appear, that in England, the consumption of Cassia is much greater than that of cinnamon; as in 1838, the quantity of cassia on which the duty of 6*d.* per pound was paid, was 88,971 pounds; whilst that of cinnamon was 16,605 pounds. (*Pereira.*)

Ceylon cinnamon has an aromatic odour, and a pleasantly pungent sweetish taste, which is dependent upon its essential oil. Its colour is a light yellow brown. The pieces are quilled within each other, and some of them not thicker than paper: they are pliable, and have a splintery fracture, especially in the longitudinal direction.

The Chinese cinnamon or cassia resembles the Ceylon cinnamon in many respects. The odour and taste are similar, but not so delicate and agreeable. The quills, too, are coarser, and in single tubes. It is not, however, always quilled. It is, also, of a darker colour than the finest of the East India Company's cinnamon, and is thicker, rougher, denser; and breaks with a shorter fracture. It is the kind of cinnamon generally kept in the shops of the United States; and possesses all the virtues of the finer cinnamons, and on account of its being much cheaper is to be preferred.

The medicinal properties of cinnamon being dependent upon its essential oil, they are readily yielded to alcohol, and, to a certain extent, to water. Like the other spices, they are excitant; and, accordingly, an *infusion* of cinnamon—*cinnamon tea*—is sometimes given in flatulence as a carminative, and wherever an agreeable aromatic is needed. It is rarely administered alone; but forms part of numerous officinal preparations, to which it is added, either to render the preparation more agreeable, or to aid in the action of the principal and perhaps less agreeable ingredients. The dose of cinnamon in powder is from ten grains to a scruple.

O'LEUM CINNAMO'MI, OIL OF CINNAMON. This is the volatile oil of the bark of *Cinnamomum Zeylanicum*, and *C. aromaticum*. It is not distilled in this country, and is, therefore, placed amongst the articles of the materia medica in the Pharmacopœia of the United States. It is obtained altogether from the East. An inferior oil is obtained from the Chinese cinnamon, which is called OIL OF CASSIA, and is said to be frequently mixed with oil of cinnamon.

Oil of cinnamon has the odour of the bark; and its taste is pungent and hot; it is of a pale yellow colour, and sinks in water. It is soluble in alcohol, with which it is said to be frequently adulterated, as well as with fixed oil. It has all the medical properties of the bark; and is used in the same cases as the other essential oils—especially in gastrodynia, and enteralgia arising from flatulence. It is added, also, as an adjuvant, to other medicines. As a powerful excitant it is sometimes used to allay the pain of dental caries, being inserted into the hollow of the tooth. The dose is ♏i. to ♏iij, dropped on sugar.

AQUA CINNAMO'MI, CINNAMON WATER. (*Ol. cinnam.* f. ʒss; *Magnes. carbonat.* ʒss; *Aquæ destillatæ*, Oij.) Cinnamon water is chiefly used as a vehicle for other medicines; but it is sometimes prescribed alone as a carminative.

PULVIS AROMAT'ICUS, AROMATIC POWDER; *Pulvis Cinnamomi compositus.* (*Cinnam.*, *Zingib.* āā ℥ij; *Cardam.*, *Myristicæ*, āā ℥j.) Dose, as a carminative, from gr. x. to xx; but it is chiefly used as an adjuvant or corrigent to other agents.

TINCTU'RA CINNAMO'MI, TINCTURE OF CINNAMON. (*Cinnam.* contus. ℥iij; *Alcohol. dilut.* Oij. It may also be prepared by the process of displacement.) Tincture of cinnamon is used as a carminative alone; but it is more commonly added to tonic and astringent mixtures. Dose f. ʒj. to f. ʒiij.

TINCTU'RA CINNAMO'MI COMPOS'ITA, COMPOUND TINCTURE OF CINNAMON. (*Cinnam.* contus. ℥j; *Cardamom.* contus. ℥ss; *Zingib.* contus. ʒiij; *Alcohol. dilut.* Oij. It may, likewise, be prepared by the process of displacement.) Used in the same cases as the simple tincture. Dose, f. ʒj. to f. ʒiij.

CONFEC'TIO AROMAT'ICA, AROMATIC CONFECTION. (*Pulv. aromat.* ℥vss; *Croci*, in pulv. ℥ss; *Syrup aurant. corticis*, ℥vj; *Mellis despumat.* ℥ij.) Aromatic confection possesses the excitant virtues of the ingredients that enter into its composition, and is adapted for cases in which a carminative is needed. It is adapted, also, as a vehicle for the exhibition of certain tonics—such as the subcarbonate of iron. Its dose is from ℈ss. to ʒj.

Cinnamon enters into the composition of the *Acidum sulphuricum aromaticum*, *Confectio aromatica*, *Pulvis aromaticus*, *Spiritus lavandulæ compositus*, *Syrupus rhei aromaticus*, *Tinctura catechu*, and *Vinum opii* of the Pharmacopœia of the United States.

2. ANI'SUM.—ANISE.

Anise or *Aniseed* is the fruit of *Pimpinel'la Ani'sum*, Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ; a native of the Levant and Egypt, but cultivated in many parts of Europe, and, occasionally, in the gardens of this country. Germany and Alicant export a large quantity of the aniseed, which is used in commerce. The Spanish variety, commonly called *Alicant aniseed*, is smaller and of a paler grayish-yellow than the rest, and is the most esteemed. The shape of all the varieties is oblong-ovate.

The odour is aromatic and familiar; and the taste sweetish, warm, and grateful.

Its medical properties are dependent upon the

O'LEUM ANI'SI, OIL OF ANISE,—which is obtained from the seeds by distillation. Its odour is like that of the vegetable; taste pungent and bitter, sweetish, and colour very pale-yellow. It congeals at a temperature of 50° Fahrenheit, and is soluble, in all proportions, in alcohol; but spirit, whose specific gravity is 0.84, dissolves only 0.42 of its weight.

The oil of anise of the British shops is imported from Germany and the East Indies, and is used in considerable quantity,—duty having been paid, in the year 1839, on 1544lbs. (*Pereira.*) The *Oleum Badiani* or *Oil of Star anise* (*Illicium anisatum*), which has the smell and taste of the oil of anise, is said to be sometimes substituted for it. It is imported into this country from the East Indies.

The oleum anisi is an officinal preparation in the Pharmacopœia of the United States, and enters into the composition of the *Syrupus Sarsaparillæ Compositus* and *Tinctura Opii Camphorata.*

The medical virtues of anise, as of all the aromatics, are gratefully excitant, and carminative. It is rarely used, however, except in cases of flatulent colic in children, or as a corrigent to medicines which are apt to cause tormina. The dose of the powder is twenty or thirty grains or more; that of the volatile oil, from ♏v. to ♏xv. dropped on sugar, or rubbed up with it, and water, or camphor water.

The infusion—*aniseed tea*—is occasionally taken sweetened, in cases of tormina; but it is not so effectual as the oil.

Aniseed water may be made extemporaneously by diffusing the oil through water by the aid of sugar, or of carbonate of magnesia; and, in the latter case, filtering through paper.

3. CARUM.—CARAWAY.

Caraway is the fruit of *Carum Ca'rui;* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ—a native of Europe, which grows in meadows and pastures, and is naturalized in England, and cultivated in the gardens of this country.

Caraway seeds are of an ovate oblong figure, and striated surface. Their odour is aromatic and peculiar; taste warm, spicy and grateful. Their medical properties are wholly dependent upon the

OLEUM CARI, OIL OF CARAWAY, which is obtained from the seeds by distillation; and, accordingly, the virtues are yielded, as in the case of anise, to both alcohol, and—to a less degree however—to water.

The medical virtues of Caraway are the same as those of anise. The dose of the dried seeds, powdered, is from a scruple to a drachm; that of the oil from one to ten drops. The latter is often added to cathartic pills and powders to correct their nauseating and griping tendency.

Caraway seeds are used in considerable quantity on the continent of Europe, for seasoning bread, cheese, and other articles of food; and they are, sometimes, baked in cakes, to which—in the opinion of perhaps most persons—they communicate an agreeable flavour, and, at the same time, gently excite the digestive function to greater activity.

The seeds form part of the *Spiritus Juniperi Compositus*, and *Tinctura Sennæ et Jalapæ*, of the Pharmacopœia of the United States.

4. CORIAN'DRUM.—CORIANDER.

Coriander is the fruit of *Coriandrum Sativum*, *officinal Coriander*, Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ, which is said to be a native of Tartary, the Levant and southern Europe, but has become naturalized in many parts of Europe, and is cultivated for medicinal purposes. It flowers in June, and the fruit is ripe in August.

The fruit is of about the shape and size of white pepper. It is finely ribbed, and may be divided into two seeds, which are adherent by their concave surfaces. The smell is aromatic, and characteristic, and is dependent upon a volatile oil, which is separable by distillation with water.

Coriander possesses all the virtues of the aromatics. It is scarcely ever given alone; but is employed as a corrigent to other remedies. It has been considered well adapted to correct the griping qualities of senna; and, accordingly, it enters into the composition of the infusion of senna; but its place might be taken with equal advantage by any of the other aromatics. It forms part of the *Confectio Sennæ*, the *Infusum Gentianæ Compositum*, the *Infusum Sennæ*, the *Tinctura Rhei et Sennæ*, and the *Tinctura Sennæ et Jalapæ* of the Pharmacopœia of the United States.

5. CARYOPHYL'LUS.—CLOVES.

Cloves are the unexpanded flowers of *Caryophyl'lus Aromat'icus;* Sex. Syst. Icosandria Monogynia, Nat. Ord. Myrtaceæ; a native of the Moluccas; but extensively cultivated at Sumatra, Mauritius, Bourbon, Martinique, St. Vincents, &c. They are collected by the hand, or separated from the tree by beating it with reeds; are received on cloths placed under the tree, and dried by the fire, or in the sun. The quantity of this spice, consumed in various ways, is great. In the year 1839, duty was paid in England on 93,549 lbs. (*Pereira.*)

The supply of the United States is derived chiefly from the West Indies, and the European colonies in Guiana. Those from the East Indies—the *Amboyna* and *Bencoolen Cloves*—are the best, being the largest, plumpest, and most oily. The Cayenne are the least valued.

Cloves resemble a small nail with a notched head—hence the name, from the French *clou*, 'a nail.' Their colour is a deep brown; odour strong, aromatic, and peculiar; taste acrid and pungent. They were found, by Trommsdorff, to be composed, in the 100 parts, of volatile oil, 18; almost tasteless resin, 6; a peculiar kind of tannin, 4; gum, 13; woody fibre, 28; and water, 18. Unquestionably, their active properties are dependent upon the volatile oil—**O'LEUM CARYOPHYL'LI**,—which is in the materia medica list of the Pharmacopœia of the United States, being obtained from cloves, on the large scale, in this country,—from seven to nine pounds of cloves, yielding about one pound of oil. (*Wood & Bache.*) The oil of cloves, as procured by distillation and repeated cohobation, is of a reddish-brown colour, and heavier than water.

The properties of cloves are similar to those of cinnamon and other aromatics,—and the essential oil is used in the same cases as the stronger essential oils.

The dose of powdered cloves is from five to ten grains; of the oil, from ♏ij to ♏vi. Water does not extract all their virtues, so that the *Infusum Caryophylli* of the pharmacopœias is not so strongly aromatic and excitant, as the quantity of the spice employed might lead to expect. All the properties are extracted by alcohol; yet the *tincture* is not officinal in the Pharmacopœias of Great Britain and Ireland, or of this country. It is contained, however, in the *Codex Medicamentarius* of Paris. (*Caryophyll.* ℥j; *Alcohol. dilut.* ℥iv.)

Oil of cloves, diluted with olive oil, has been used as an embrocation in hooping-cough; but it possesses no virtues as a rubefacient over other essential oils of equal strength.

INFU'SUM CARYOPHYL'LI, INFUSION OF CLOVES. (*Caryophyl.* cont., ʒij; *Aquæ bullient.* Oj.) The dose of this, as an aromatic, is f. ℥iss. to f. ℥iij.

Cloves enter into the composition of the *Spiritus Lavandulæ compositus*, the *Syrupus Rhei compositus*, and the *Vinum opii* of the Pharmacopœia of the United States.

6. FŒNIC'ULUM.—FENNELSEED.

Fennelseed are the fruit of *Fœnic'ulum vulga're*—Sex. Syst. Pentandria Monogynia; Nat. Ord. Umbelliferæ,—a native of the south of Europe, Italy, Portugal, &c., but cultivated in the gardens of the United States. The whole plant possesses the odour of the seeds; but they, alone, are officinal.

They are of an ovate shape; fragrant odour; and warm, sweet, and, to most persons, agreeably aromatic taste. Their virtues are dependent upon an essential oil, which is separated by distillation—the **OLEUM FŒNIC'ULI.** The seeds contain about 2.5 per cent. Pereira states, on private information, that 19 *cwts.* yield 78 *lbs.* of oil. It congeals below 50° of Fahrenheit, and its s. g. is 0.997. That which is used in the shops of the United States is imported.

AQUA FŒNIC'ULI, FENNEL WATER, has been admitted into the last edition of the Pharmacopœia of the United States. It is rarely used except as a carminative in the bowel affections of infancy. It may be made by rubbing the oil with carbonate of magnesia, then adding water, and filtering through paper, as in the case of cinnamon water. Boiling water, however, extracts the essential properties, and *Fennel tea* is a common preparation as a domestic carminative.

The dose of the powdered seeds is from ℈j to ʒj; that of the oil from ♏ij. to ♏xv.

Fennelseed enters into the composition of the *Spiritus Juniperi compositus* of the Pharmacopœia of the United States.

7. MENTHA PIPERI'TA.—PEPPERMINT.

Peppermint, Sex. Syst. Didynamia Gymnospermia; Nat. Ord. Labiatæ; is indigenous in Great Britain, and is found in various parts of Europe, and in Asia and Africa. It has also been introduced into this country, and, in some parts of it, is largely cultivated on account of its volatile oil. It is a perennial, but the cultivators have observed, that, in order to maintain its flavour in perfection, it is necessary to transplant the roots every three years. (*Wood & Bache.*)

It is cut for medical use in August, about the period of the development of the flowers.

The odour of peppermint is strong, and, to most persons, agreeable; the taste is pungent and aromatic, and it produces a sensation of coldness in the mouth. Its virtues are essentially dependent upon volatile oil, which rises on distillation with water, along with an appreciable portion of camphor. Its constituents are like those of lavender.

Like other aromatics, peppermint communicates its virtues to hot water, but less completely than to alcohol.

Peppermint is much employed as an aromatic excitant and carminative,—in popular practice more perhaps than any of the others,—as well as to correct the operation of cathartic and other agents, or to mask the taste of nauseous medicines.

It may be given in the form of infusion—*Peppermint tea*—which is a common domestic remedy, but is not officinal. The officinal preparations are the following:

O'LEUM MENTHÆ PI'PERI'TÆ, OIL OF PEPERMINT, obtained by distilling the fresh herb with water, is distilled in considerable quantity in this country; the amount yielded by the plant varying according to the season,—a warm and dry season being the most favourable. The largest produce in Great Britain is said to be three drachms and a half of oil from two pounds of the fresh herb,—the smallest about a drachm and a half from the same quantity. (*Brande.*) It has a strong odour like that of the plant; an acrid, very hot, and biting taste, with a peculiar sensation of coldness; it is of a greenish yellow colour; and of a specific gravity, according to some, from 0.907 to 0.920, according to others, 0.899.

As an excitant aromatic and carminative, it is taken in the dose of one to five drops, on sugar, dissolved or not in water.

TINCTU'RA O'LEI MENTHÆ PIPERI'TÆ, TINCTURE OF OIL OF PEPPERMINT. (*Ol. menth. piperit.* f. ℥ij; *Alcohol.* Oj.) This tincture—long known and used under the name of *Essence of Peppermint*—is used in the same cases as the volatile oil. Dose, 10 to 20 drops on sugar.

AQUA MENTHÆ PIPERI'TÆ, PEPPERMINT WATER. This water may be distilled from the herb, fresh or dried; but, in the United States Pharmacopœia, it is directed to be made like the *Aqua Cinna-*

momi (p. 448), by rubbing half a fluidrachm of the *oil* with half a drachm of the *carbonate of magnesia*, adding gradually two pints of *distilled water*, and filtering.

Peppermint water possesses, in a certain degree, the properties of the plant, but it is chiefly used as a vehicle for other remedies. Dose f. ℥i. to ℥iij.

TROCHIS'CI MENTHÆ PIPERI'TÆ, TROCHES OF PEPPERMINT. (*Ol. menth. piperit.* f. ʒi; *Sacchar.* in pulv. ℔j; *Mucilag. tragacanth.* q. s., to be divided into troches weighing ten grains each.) Peppermint lozenges are used as a gentle carminative, but they are rarely prescribed by the physician.

8. MENTHA VIR'IDIS.—SPEARMINT.

Spearmint, occupying botanically the same place in the Sexual System and the same Natural Order as the last, has similar medical virtues and composition, but it is not so agreeable, although by some considered more so. It is cultivated in the gardens of this country for its oil; and flowers in August.

OLEUM MENTHÆ VIR'IDIS, OIL OF SPEARMINT—TINCTU'RA O'LEI MENTHÆ VIR'IDIS, TINCTURE OF OIL OF SPEARMINT, *Essence of Spearmint*, and **AQUA MENTHÆ VIR'IDIS, SPEARMINT WATER,** are officinal in the Pharmacopœia of the United States.

9. MONAR'DA—HORSEMINT.

Monar'da Puncta'ta; Sexual System, Diandria Monogynia; Nat. Ord. Labiatæ, is an indigenous plant, which grows on light gravelly or sandy soils, from New Jersey to Louisiana, and flowers from June to September. The whole herb is officinal in the Pharmacopœia of the United States. Its smell is aromatic; taste warm, pungent and bitterish.

Like the other mints its properties are dependent upon volatile oil, which may be separated by distillation with water. An *infusion—horsemint tea*—is a domestic remedy as a carminative; but is rarely employed by the practitioner.

O'LEUM MONAR'DÆ, OIL OF HORSEMINT, distilled from the fresh herb is of a reddish amber colour, of an odour like that of the plant, and a warm, very pungent taste. It is a powerful rubefacient, when applied to the cutaneous surface, exciting even vesication; hence, it has been used in low fevers, chronic pains, cholera infantum, and other diseases in which rubefacients are considered to be indicated.

Dose, as an excitant, should it be desirable to administer it internally, two to three drops on sugar.

10. HEDEO'MA.—PENNYROYAL.

Hedeo'ma Pulegioi'des, or *Cuni'la Pulegioi'des;* SEX. SYST. Diandria Monogynia; NAT. ORD. Labiatæ, is indigenous in the United States, in all parts of which it is common in dry grounds and pastures,—its presence being very perceptible from the strong odour exhaled by it. It is not the same as the European pennyroyal, which is the *Mentha Pulegium,* yet the virtues of the two are identical.

Hedeoma has an agreeable aromatic odour, and a warm pungent taste resembling that of mint. Like the mints, its medical properties are wholly dependent upon an essential oil—the **O'LEUM HEDEO'MÆ**, which is separated by distillation with water. They are readily yielded to hot water, and *pennyroyal tea,* is a common domestic remedy, supposed to favour the advent of the menses, but possessing no special virtues of an emmenagogue kind.

Like the aromatics in general, infusion of pennyroyal is given as a carminative in all cases in which a gently excitant agency on the stomach is needed. When taken hot, like all the aromatics, it promotes perspiration.

The oil, which has a light yellow colour, and the smell and taste of the herb, and is of the specific gravity 0.948, is used in the same cases as the aromatic oils in general. The dose is from two to ten drops.

11. ORIG'ANUM.

Orig'anum vulga'rē, or *common Marjoram;* SEX. SYST. Didynamia Gymnospermia; NAT. ORD. Labiatæ, is a native of America, Europe and Asia. In the United States, from Pennsylvania to Virginia, it grows along the roadsides, and in dry stony fields, and is in flower from June to October. It is rarely, however, employed medicinally. Its medical properties, which are dependent upon an essential oil separable by distillation with water, are the same as those of the mints, and the aromatic herbs in general; but it is very rarely used.

O'LEUM ORIG'ANI, OIL OF ORIGANUM, *Oil of Marjoram, Oil of Thyme*, when recently and properly prepared, is of a yellowish colour; but if too much heat be used in the distillation, it is said to be reddish, and to acquire the same hue by age. It has the smell of the plant, and a hot very acrid taste. Two hundred weight of the plant is said to yield, on the average, one pound of oil. (*Brande.*) It is scarcely ever given internally; being generally employed as an external irritant in the same cases as the oleum monardæ; and in carious odontalgia, a drop being introduced on cotton or lint into the hollow of the tooth.

The oil enters into the composition of the *Linimentum Saponis Camphoratum* of the Pharmacopœia of the United States.

12. MYRIS'TICA.—NUTMEG.

Nutmegs are the kernels of the fruit of *Myris'tica Moscha'ta;* Sex. Syst. Diœcia Monadelphia; Nat. Ord. Myristicaceæ, a native of the Moluccas. The fruit is round or oval, of the size of a small peach. The outer covering, which is at first thick and fleshy, and abounds in an austere astringent juice, afterwards becomes dry and coriaceous; and, separating into two valves from the apex, discloses a yellowish or red reticulated membrane or *arillus,* which is the *mace* of commerce, closely investing a thin brown shell, which contains the kernel or nutmeg.

The fruit is gathered by the hand, and the outside envelope is rejected. The *mace* is then carefully separated, flattened, and dried in the sun.

The nuts are dried in the sun or in ovens, and exposed to smoke, until the kernel rattles in the shell. They are then broken open, and the kernels having been removed, and steeped, for a short time, in a mixture of lime and water, to protect them from the depredation of insects, they are cleaned, and packed in chests for exportation. The nutmegs are very liable to the attacks of an insect called the *nutmeg insect.*

Nutmegs are imported into England from the Indian Archipelago, either directly, or indirectly by the Cape of Good Hope, or Holland. In 1838, duty was paid on 114,093 lbs. (*Pereira.*) Into this country, they are brought either directly from the East Indies, or indirectly through England and Holland. They are occasionally exported in small quantities from the West Indies, into which their culture has been introduced. (*Christison.*)

Nutmegs have a fragrant aromatic odour, and an agreeable pungent taste; are of a roundish or oval shape; streaked; of a grayish colour, yielding readily to the knife or the rasp, but not easily pulverizable. On analysis, they are found to contain volatile oil; red fat, soluble in alcohol; yellow fat, insoluble in alcohol; alcoholic extractive; amidin, and ligneous fibre, with lime. (*N. E. Henry.*)

The volatile oil—**OLEUM MYRISTICÆ**—procured by submitting nutmegs to distillation with water, is always imported from the East Indies. It is colourless or pale yellow, and has the smell and taste of the nutmeg. By agitation with water, it separates into two oils,—the one lighter, the other heavier than water.

The *Oleum Myristicæ* of the former Pharmacopœia of the United States, and of two of the British Pharmacopœias, is the expressed oil, improperly called *oil of mace*, inasmuch as mace yields a volatile oil on distillation with water, similar to the volatile oil of nutmeg.

The expressed oil is prepared by beating nutmegs to a paste, which is inclosed in a bag, exposed to the vapour of water, and expressed between heated plates. The nutmeg is said to yield 10 or 12 per cent. of this oil.

The best is imported from India in stone jars. An inferior kind is in oblong cakes, covered with the leaves of some plant. It is composed of *tallow-like oil*, 7; *yellow oil*, 8⅓; *volatile oil*, ⅔. (*Pereira.*) An artificial preparation is said to be sometimes substituted for the genuine oil. It is made by mixing together various fatty matters, as suet, palm oil, spermaceti, wax, lard, &c., adding some yellowish or brownish colouring substance, and giving flavour to the mixture by the volatile oil of nutmeg.

This expressed oil is never used internally; and rarely as a gentle local excitant; and therefore it has been properly left out in the last edition of the Pharmacopœia of the United States.

Nutmeg possesses the virtues of all the aromatic excitants, of which it is one of the most agreeable; and, therefore, most used. It is a well known spice to give flavour to alimentary substances, and is used therapeutically for the same purpose, as well as to mask the flavour of other less agreeable agents. It is said to have proved narcotic in India, when administered in large doses; but, practically, no such effects are ever witnessed from it here. A recent writer asserts, that he is acquainted with a case in which the narcotic effects of a whole nutmeg were several times experienced. (*Pereira.*)

Either nutmeg or mace, whose medical properties are analogous, may be given, in the dose of from ℈j. to ʒss., in powder obtained by grating: or, the oleum myristicæ may be employed in the dose of ♏j. to ♏x.

SPIRITUS MYRISTICÆ, SPIRIT OF NUTMEG. (*Myristic.* contus. ℥ij; *Alcohol. dilut.* cong. *Aquæ*, Oj. Distil a gallon.) It possesses the virtues of nutmeg; but is chiefly used as an agreeable adjunct to other agents. Dose, f. ʒj. to f. ʒiij.

Nutmeg enters into the composition of the *Spiritus Lavandulæ compositus*, the *Syrupus Rhei aromaticus*, the *Trochisci Cretæ*, and the *Trochisci Magnesiæ* of the Pharmacopœia of the United States.

13. SAS'SAFRAS RADI'CIS CORTEX.—BARK OF SASSAFRAS ROOT.

Laurus Sas'safras, Sex. Syst. Enneandria Monogynia; Nat. Ord. Lauraceæ, (*Lindley*,) is an indigenous tree, common throughout the United States; which blooms in the Middle States in the beginning of May. The wood is used in Europe, whither it is sent in billets; but it is not much employed in this country,—the bark of the root being the officinal portion given as an excitant.

The bark, as found in the shops, is generally in small irregular pieces, invested, at times, with a browish epidermis; of a reddish colour, very brittle, and presenting, when freshly broken, a lighter colour than that of the exposed surfaces. Its odour is fragrant, and has been compared to that of fennel; and the taste aromatic and sweetish. The virtues are dependent upon a volatile oil, which is separable by distillation with water. They are yielded readily to water, so that the infusion is occasionally employed as an excitant. *Sassafras tea* has, indeed, been used in some parts of the country, in place of Chinese tea. Flavoured with milk and sugar, it is sold at day-break in the streets of London, under the name of *Saloop*.

The medical properties of sassafras are those of the Lauraceæ in general. It is rarely, however, used as an excitant. It is employed, mainly as an adjunct to diet drinks in syphilis and syphiloid affections; but, in this respect, has by no means the reputation it enjoyed formerly.

OLEUM SAS'SAFRAS, OIL OF SASSAFRAS,—the oil obtained by distillation with water,—is one of the heaviest of the volatile oils; s. g. 1.094. The bark yields from 1.25 to 2 per cent. It is of a yellow colour, turning reddish by age, and has the odour of the sassafras, and a warm, pungent, aromatic taste. By agitation with water, it separates into two oils; one lighter, the other heavier, than water.

Sassafras oil possesses the virtues of all the aromatic oils; but it is rarely given. Dose, ♏j. to ♏x.

Sassafras bark enters into the composition of the *Decoctum Sarsaparillæ Compositum*, of the Pharmacopœia of the United States; and sassafras oil into that of the *Syrupus Sarsaparillæ Compositus*.

14. LAVAN'DULA.—LAVENDER.

Lavan'dula vera, Common or *Garden Lavender;* Sex. Syst. Didynamia Gymnospermia; Nat. Ord. Labiatæ, is a native of southern Europe, but is largely cultivated in Great Britain, and, also, in the gardens of this country, where it flowers in August. All the plant possesses the same properties; but the flowers or spikes are alone officinal, which should be cut when they begin to bloom.

Lavender flowers are of a bluish-gray colour; and have a fragrant, agreeable odour, and a warm bitterish taste. When subjected to analysis, they afford volatile oil, resin [?], tannic acid, a bitter principle, and woody fibre; but the oil is the active constituent. It is obtained by distilling the flowers with water.

The medical virtues of lavender are those of an excitant like other aromatics, but as its taste is not as agreeable as many of them, it is rarely prescribed alone. It is more frequently used as an adjunct to other remedies administered in cases of nervous debility; or to articles whose disagreeable odour it is desirable to conceal or mask.

O'LEUM LAVAN'DULÆ, OIL OF LAVANDER, is of a lemon colour, has a fragrant odour—that of the flower—and a warm taste. Its specific gravity varies from 0.877 to 0.905—the lightest oil being the purest. The oil obtained from the whole herb has the specific gravity 0.9206, but the odour of the oil is considerably deteriorated, when the stalks and leaves are used in the distillation. (*Brande.*) One pound of oil is obtained from fifty to seventy pounds of the flowers.

Like the other essential oils, it is soluble in alcohol of a certain specific gravity. That of 0.830 dissolves it in all proportions; that of 0.887 dissolves only 42 per cent.

The oil is chiefly used as a perfume; but occasionally it is employed as a carminative, especially in nervous headache, hysteria, &c., in the dose of from one to five drops on sugar.

SPIR'ITUS LAVAN'DULÆ, SPIRIT OF LAVENDER. (*Lavandul.* recent. ℔ij; *Alcohol.* cong.; *Aquæ* Oij; distil a gallon.) This preparation is rarely employed alone. It is chiefly used for the formation of other officinal compounds. It is often made by adding the oil of lavender to rectified spirit.

SPIR'ITUS LAVAN'DULÆ COMPOS'ITUS, COMPOUND SPIRIT OF LAVENDER, *Compound tincture of lavender, Lavender drops, Red lavender drops.* (*Spirit. lavandul.* Oiij; *Sp. rosmarin.* Oj; *Cinnamom.* cont. ℥j; *Caryophyll.* cont. ʒij; *Myristic.* cont. ℥ss; *Santal.* rasur. ʒiij.) This is one of the most common remedies prescribed by the practitioner, and employed by the unprofessional in nervous and hysterical affections, and in cases of faintness or depression. It is, also, added, occasionally, to other excitants and to tonic mixtures. The dose is from f. ʒj. to f. ʒij., dropped on sugar.

Lavender water—as it is termed in the shops—is a solution of oil of lavender, and other scents in spirit. It is chiefly used as a perfume.

15. ROSMARI'NUS.—ROSEMARY.

Rosmari'nus officina'lis or *common rosemary:*—Sex. Syst. Diandria Monogynia; Nat. Ord. Labiatæ, an evergreen shrub, grows spontaneously in southern Europe, and Asia Minor, and is cultivated in the gardens of Great Britain and this country. The tops or flowering summits are the officinal portion. Their odour is fragrant and grateful; taste, aromatic and bitterish.

The medical virtues of rosemary, which are dependent upon essential oil, are communicated partially to water, wholly to alcohol. They are those of the labiate plants in general,—as the mints, many of which have been supposed to be possessed of emmenagogue properties; but probably only through the excitant influence of the essential oil. It is rarely given internally; and when it is so, it is usually as an adjunct. Dose of the powder, gr. x. to ʒss.

O'LEUM ROSMARI'NI, OIL OF ROSEMARY, is procured from rosemary by distillation with water. The fresh leaves afford the oil in considerable quantity, yet great discrepancy exists as to the precise amount: some stating it at 26 per cent. (*Baumé*, cited by *Wood & Bache*); others hold, that one pound of the fresh herb yields about a drachm of the oil. (*Brande.*) The former estimate is evidently an exaggeration. Oil of rosemary is transparent and colourless, having a very fragrant odour, and taste like that of the plant. Its specific gravity is about 0.85. When long kept, it deposits a substance identical with camphor.

It is rarely prescribed internally, although calculated to act as a nervine as well as the *Oleum lavandulæ*. It is generally associated with other substances as a topical excitant, and hence forms part of various rubefacient liniments.

If administered internally, it may be in the same dose as the other aromatic volatile oils,—three to ten drops.

SPIRITUS ROSMARI'NI, SPIRIT OF ROSEMARY. (*Ol. Rosmarin.* ʒij; *Alcohol.* cong.; *Aquæ*, Oj; distil a gallon.) It is rarely employed internally, but is added to lotions and liniments, as the *Lini-*

mentum saponis; and to one compound excitant tincture—the *Spiritus lavandulæ compositus.*

The *Queen of Hungary's water* is formed extemporaneously by a mixture of spirit of lavender and spirit of rosemary, (*Sp. Lavand.* f. ℥xii; *Sp. Rosmarin.* f. ℥iv.) It is chiefly used as a perfume; and, also, as an excitant, in the same cases as the *compound spirit of lavender,*—for example, in nervous depression, fainting, &c. It makes, likewise, a good excitant liniment.

Oil of rosemary enters into the composition of the *Linimentum saponis camphoratum,* and the *Tinctura saponis camphorata* of the Pharmacopœia of the United States.

16. GAULTHE'RIA.—PARTRIDGE BERRY.

Gaulthe'ria procum'bens, Sex. Syst. Decandria Monogynia; Nat. Ord. Ericeæ, is indigenous from Canada to Georgia, growing in mountainous tracts, in large beds, and in dry, barren and sandy plains, beneath the shade of shrubs and trees, and especially of other evergreens. It has various names in different parts of the United States, such as *deerberry, teaberry, wintergreen,* and *mountain tea, berried tea, grouseberry,* &c.; some of the names being owing to the circumstance, that the fruit is a favourite article of food with partridges, deer, and grouse. It flowers from May to September.

The leaves, which are the officinal part of the plant, owe their virtues to an essential oil, **O'LEUM GAULTHE'RIÆ**—separable by distillation with water. They contain, also, tannic acid, which gives them marked astringency. The oil has a brownish yellow colour, a sweetish, pungent, peculiar taste, and an agreeable and peculiar odour. It is heavier than any of the essential oils; its specific gravity being 1.17.

The medical properties of gaultheria, are those of the aromatics in general. It possesses at the same time a slight astringency, which may adapt it to certain cases of diarrhœa; but it is chiefly used, on account of its agreeable flavour, as an adjunct to other medicines.

Hot water extracts its virtues, and, therefore, it may be used in the form of infusion or tea. The oil is, however, most commonly employed. It is an ingredient of the *Syrupus sarsaparillæ compositus* of the Pharmacopœia of the United States.

17. JUNIP'ERUS.—JUNIPER.

Juniper or *juniper berries* is the fruit of *Junip'erus commu'nis;* Sex. Syst. Diœcia Monadelphia; Nat. Ord. Coniferæ—a native of the north of Europe, but introduced into this country, in some parts of which it has become naturalized. In the pharmacopœias of Europe, not only the berries, but the tops and wood are officinal; but as the berries possess all the virtues, they alone are officinal in the Pharmacopœia of the United States. They are round, of about the size of a pea, and more or less shrivelled; of a blackish purple colour, and covered with a glaucous bloom. The taste is sweetish, with a terebinthinate flavour.

The property on which their virtues are dependent is a volatile oil, separable by distillation with water; and they are communicated to water and to alcohol. They are, consequently, excitant, yet neither they, nor any of the preparations, are much exhibited as excitants.

They are chiefly prescribed as diuretics, under which class some of the preparations are mentioned. The essential oil is the only one that needs comment here.

O'LEUM JUNIP'ERI, OIL OF JUNIPER. The oil, used in this country, is chiefly obtained from Europe. Its odour is similar to that of turpentine; its taste acrid, hot, and like that of the juniper; and its colour light greenish yellow; s. g. 0.911. It is said to be adulterated occasionally with oil of turpentine, which renders it of considerably less specific gravity.

The dose of the oil, as an excitant, is from five to fifteen drops.

Juniper berries enter into the composition of the *Spiritus juniperi compositus* of the Pharmacopœia of the United States.

18. LIMO'NIS CORTEX.—LEMON PEEL.

The outer rind of the fruit of *Citrus Limo'num*, *Lemon tree;* Sex. Syst. Polyadelphia Icosandria; Nat. Ord. Aurantiaceæ, is officinal in most of the pharmacopœias. The lemon tree has been considered a native of Asia. It is now, however, naturalized throughout the whole of the south of Europe, in northern Africa, Asia Minor, and in many of the more temperate regions of the tropics. It is largely cultivated in Spain, Portugal, Italy, Sicily, and southern France, and we observe it, occasionally, fostered and protected in our own gardens. The lemons that are used in England are imported chiefly from Spain, Portugal, Italy, and the Azores; those used in this country come mainly from the West Indies and the Mediterranean.

Lemon peel has a fragrant well known odour, and a warm, aromatic, bitter taste. By drying it loses a good deal of its warmth and odour. It yields by expression or distillation, an essential oil, **O'LEUM LIMO'NIS** which is obtained on the large scale, but not by the apothecary, and is, therefore, placed in the Materia Medica list of the Pharmacopœia of the United States.

The virtues of lemon peel are yielded to water and to alcohol.

Lemon peel is indebted to its essential oil for its excitant virtues. It forms an agreeable adjunct to excitant or tonic infussions, but is rarely given alone. It enters into the composition of the *Infusum Aurantii* of the Edinburgh and Dublin Pharmacopœias, and of the *Infusum Gentianæ Compositum* of the Dublin and London Pharmacopœias.

O'LEUM LIMO'NIS, OIL OF LEMONS. This, as remarked above, is obtained either by expression or distillation. In the former process, the rind is grated from the fruit, and then expressed in hair sacks. The oil is suffered to remain at rest until it deposits some of its impurities, after which it is decanted and filtered. Thus obtained, it is turbid, and, owing to its containing mucilaginous matter, does not keep so well as that obtained by distillation, but its flavour is said to be more pleasant and sweet. It possesses, in a high degree, the flavour of the fruit. It is of a pale yellow colour, and is said to be sometimes adulterated with fixed oil, and with alcohol. The former adulteration can be detected, as in the case of volatile oils in general, by its leaving a stain on paper, when dropped on it and evaporated by a gentle heat: the latter is known by agitation with water producing milkiness.

Oil of lemons has the same excitant properties as other volatile oils; and, like them, may be given as a carminative dropped on sugar, or rubbed up with it. It is generally, however, used as a perfume to cover the objectionable odour of other substances. Its employment in certain cases of conjunctivitis has been referred to in an early part of this volume.

Oil of lemons is a constituent of the *Unguentum Veratri albi*, of the Pharmacopœia of the United States.

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19. O'LEUM BERGA'MII, OIL OF BERGAMOT—the volatile oil of the rind of the fruit of *Citrus Limet'ta, Citrus Limetta Berga'mium, Citrus Berga'mia*, or *Bergamot Citrus*, which is cultivated in the south of Europe—is in the Materia Medica list of the Pharmacopœia of the United States. It is imported from the

south of Europe. It is only used as a scent to cover nauseous substances; and, with this view, it is made to form part of the *Unguentum Sulphuris compositum* of the Pharmacopœia of the United States.

20. AURAN'TII CORTEX.—ORANGE PEEL.

Orange peel is the outer rind of the fruit of *Citrus Vulga'ris, Bigarade* or *Bitter Orange Tree,* and of *Citrus Auran'tium, Common* or *Sweet Orange Tree;* SEX. SYST. Polyadelphia Icosandria; NAT. ORD. Aurantiaceæ. The orange is a native of Asia. It grows wild in various parts of northern Africa and Eastern Asia, and is cultivated in the warmer parts of the globe almost everywhere. In the southern portions of the United States, it is extensively cultivated, but the fruit is chiefly brought from the West Indies, the Western Isles, and the south of Europe.

Various parts of the orange tree, besides the peel of the fruit, are used in medicine. The leaves have a slightly bitter taste, and are aromatic and tonic. They contain a volatile oil, which is obtained by distillation, and constitutes the *Essence de Petit Grain,* of the French *Pharmaciens.* The flowers have an agreeable odour, dependent upon essential oil—which has been termed *Neroli Oil;*—550 pounds of the flowers yielding about an ounce. It is used altogether in perfumery. The distilled water of the flowers, called *Orange-flower Water,* is much prescribed by the French as a nervine. The immature oranges, which fall off, are aromatic and bitter, and are used for flavouring curaçoa; hence they are called *Curaçoa Oranges.* When smoothed by a lathe, they form the best *issue-peas* of the shops. The rind of the fruit, like that of the lemon, yields a volatile oil, which resembles, in odour, the rind itself; but it is directed to be separated by distillation by many of the colleges.

Orange peel possesses similar properties to lemon peel, and is applicable to the same cases. It is an aromatic excitant, and is prescribed as an adjunct to tonic and excitant infusions, chiefly with the view of communicating flavour to them. The bark of the bitter, or Seville orange, is to be preferred where it is advised as a tonic adjunct or adjuvant. It is never, perhaps, given in substance.

CONFECTIO AURANTII, CONFECTION OF ORANGE PEEL. (*Aurant. cort.* recent. [separated by grating] ℔j; *Sacchar.* ℔iij.) This confection is not much used. It possesses the aromatic virtues of orange peel, and may be employed as a vehicle for bitter powders, or for some of the preparations of iron, as the subcarbonate.

SYR'UPUS AURAN'TII COR'TICIS, SYRUP OF ORANGE PEEL. (*Aurant. cort.* contus. ℥ij; *Aquæ bullient.* Oj; *Sacchar.* ℔iiss.) This syrup is chiefly employed to give an agreeable flavour to excitant and tonic infusions: f. ʒiij. of it may be added to f. ℥vi. of any of these. It enters into the composition of the *Confectio aromatica* of the Pharmacopœia of the United States.

21. CAM'PHORA.—CAMPHOR.

Camphor is a peculiar concrete substance, derived from *Laurus Cam'phora,* and purified by sublimation. It is not properly an essential oil, and yet it agrees in many of its properties with them. It differs, however, in its solidity at ordinary temperatures, and in its not being converted into resin by the oxygen of the air, or by nitric acid. (*Pereira.*)

Laurus Cam'phora—Sex. Syst. Enneandria Monogynia, Nat. Ord. Lauraceæ—is a native of China, Japan and Cochin China, and is said to have been introduced from Japan into Java. In China, it is affirmed, the chopped branches are steeped in water, and afterwards boiled, until the camphor begins to adhere to the stick used in stirring. The liquid is then strained, and, on standing, the camphor concretes: alternate layers of finely powdered earth, and of this crude camphor, are then placed in a copper basin, to which another, inverted, is luted. Heat is now applied and the camphor sublimes. In Japan, the process is somewhat different; the roots and wood are chopped up, and boiled with water, in an iron vessel, to which an earthen head containing straw is adapted. On the application of heat, the camphor sublimes and condenses on the straw.

Two kinds of crude camphor occur in commerce, one called *tub camphor,* from being imported in tubs. It comes from Batavia, but is said to be the produce of Japan; it is, also, called *Dutch camphor,* and *Japan camphor.* The other kind—*common crude camphor, China camphor, Formosa camphor,* is imported from India in square chests. It is chiefly produced in the island of Formosa. This crude camphor is in small grains, or granular masses, of a dirty white colour, but is never found in the shops. It is refined by sublimation. Formerly, all the refined camphor was obtained from abroad; but now the process is effected on a large scale in this country, and the camphor is considered equal to any that was formerly imported. The crude camphor is mixed with a small proportion of quicklime, and exposed, in a glass or earthenware vessel, in a sand-bath, to a gradually increased heat, by which it is melted, and ultimately converted into vapour which is condensed in a suitable vessel. (*Wood & Bache.*)

The refined camphor of the shops has the form of the vessel in which the sublimation has been accomplished, and is, therefore, generally in the form of large hemispherical cakes; convex on one side, concave on the other, and perforated in the centre. It is of a white colour, semi-pellucid, brittle, yet easily pulverizable, and of a crystalline texture. Its odour is strong, peculiar, and fragrant; taste bitterish and aromatic, accompanied by a sensation of coldness. It evaporates in the air at ordinary temperatures; and in closed vessels, as in the bottles in the shop of the apothecary, which are exposed to light, it evaporates, and crystallizes on the sides of the bottle. It is soluble to a slight extent only in water; but is soluble in alcohol, ether, the oils both fixed and volatile, &c. If water be added to the solution in alcohol, the camphor is immediately precipitated. Its specific gravity is 0.9857.

There are few articles of the Materia Medica, regarding the effects of which, on the animal economy, there has been greater diversity of sentiment. In respect, however, to its excitant action in certain doses, there is but little disagreement; and it is this action only, that has to be considered here. When it is applied endermically, it excites pain, and if held in the mouth occasions heat, redness and other signs of hyperæmia in the mucous membrane of the mouth; and when swallowed in substance, the sensations experienced in the epigastric region are similar to those induced by the essential oils in general.

It is asserted by some, that depression has preceded the excitation induced by it; but although the author has administered it in numerous cases with the view of carefully observing its effects, he has never witnessed this preceding sedation. In regard to its deleterious effects on the nervous system when taken in large doses, and the discordant views in relation thereto, opportunity may be afforded to treat in another place.

It may be remarked here, that whilst strangury has been ascribed to it by some; it is the main remedy on which many others depend in cases of strangury, in that especially which is induced by cantharides. The author has neither observed the influence of camphor in one case nor in the other. He is not disposed to place much value upon it as an excitant in those cases in which it has been so much extolled by many. It is chiefly in adynamic and long protracted fevers, that it has been prescribed; but almost always associated with some other agent, as with opium, where the object has been to allay restlessness and irritation, and, at the same time, to induce—as it has been conceived—some tendency towards the skin;—or with carbonate of ammonia, where the prostration has been more considerable. In none of these cases, perhaps, does the practitioner look solely to the excitant agency of the camphor; but rather to that narcotic influence which has been ascribed to it by some.

Whatever properties it has appeared to possess as a diaphoretic —and the belief in which has led to its use in other diseases, as chronic rheumatism, gout, &c.—have been probably owing to its gently excitant agency; but farther reference has been made to this subject under another head.

Camphor forms part of many of the officinal and other liniments, of different pharmacopœias and formularies, as well as of domestic use. In such cases, it is usually combined with other excitants.

The medium dose of camphor, in substance, is generally stated at from five to ten grains; which may be given rubbed up with sugar, or—what is preferable—in the form of pill. An objection has been urged against the pilular form—that as, in this state, the camphor is with difficulty dissolved in the gastric fluids, it may float on the top, and be apt to excite nausea, or pain and uneasiness at the upper orifice of the stomach. (*Wood & Bache*). The author has never witnessed any of these results, which probably occurred, in the cases where they have been met with, in consequence of the dose having been large. At the same time, with the opinion, which he possesses of the value of camphor as an excitant, he is disposed to place as much reliance on an ordinary dose of the *Aqua camphoræ* of the pharmacopœia, which contains a very small amount of camphor, as on a larger dose administered in pill or powder.

AQUA CAMPHORÆ, CAMPHOR WATER. (*Camphor.* ʒij; *Alcohol.* ♏xl; *Magnesiæ carbonat.* ʒj; *Aquæ destillat.* Oij.) The alcohol is added to break down the cohesion of the camphor, and the carbonate of magnesia facilitates its solution. Each fluidounce of the water is computed to contain three grains of camphor. The usual dose is from f. ℥ss. to f. ℥j. and more.

TINCTURA CAMPHORÆ, TINCTURE OF CAMPHOR. (*Camphor.* ℥v; *Alcohol.* Oij.) This is the "*camphorated spirit of wine,*" of the older pharmacopœias. It is rarely given internally. If desirable, however, from 10 to 60 drops may be rubbed up with sugar and water be added to make a draught. Should the water be added without this precaution, the greater part of the camphor would be separated. Water must, consequently, be regarded as an incompatible.

Tincture of camphor is generally, however, employed as an excitant liniment in sprains, and bruises, in cases of deep-seated pains, of a rheumatic or neuralgic kind, in which it is desirable to excite revulsion on the surface; and to modify the nutritive actions of a part, as in cases of tumours.

LINIMEN'TUM CAMPHORÆ, CAMPHOR LINIMENT. (*Camphor.* ℥ss; *Olei olivæ*, f. ℥ij.)

LINIMEN'TUM SAPO'NIS CAMPHORA'TUM, CAMPHORATED SOAP LINIMENT, OPODELDOC. (*Sapon. vulgar.* ℥iij; *Camphor.* ℥j; *Ol. rosmarin.*, *Ol. origan.* āā f. ʒj; *Alcohol.* Oj.)

TINCTU'RA SAPO'NIS CAMPHORA'TA, CAMPHORATED TINCTURE OF SOAP, *Soap Liniment.*) *Sapon.* in rasur. ℥iv; *Camphor.* ℥ij; *Ol. rosmarin.* f. ℥ss; *Alcohol.* Oij.)

These various liniments are employed under the same circumstances as the Tinctura camphoræ. They are better adapted, however, for prolonged friction, by reason of the admixture of soap, or oil, or both, and, consequently, are generally prescribed where the object is to discuss tumors; or to occasion the taking up of any solid or fluid deposition.

Camphor forms part of the *Tinctura Opii Camphorata* of the Pharmacopœia of the United States.

22. CANEL'LA.

Canella is the bark of *Canel'la alba*, *Laurel-leaved Canella* or *Wild Cinnamon*; Sex. Syst. Dodecandria Monogynia; Nat. Ord. Meliaceæ;—Guttiferæ (*Jussieu*), a tree, from ten to fifty feet high, which is indigenous in the West India Islands, and the neighbouring continent of America.

Canella of the shops is the inner bark of the stem and branches, occurring in quills, but sometimes in flat pieces of considerable size. It is of a pale orange-yellow colour, and of an odour and taste intermediate between those of cloves and cinnamon. It is confounded at times with *Winter's Bark* (q. v.), and hence has been called *spurious Winter's Bark*. It certainly resembles it in taste, but not much in appearance.

When subjected to analysis, canella yields volatile oil, which is its active ingredient; a little bitter extractive, which communicates to it what tonic property it possesses; besides other matters of less importance. Alcohol extracts all its virtues.

Canella possesses the ordinary excitant virtues of the aromatic barks, and may be prescribed in the dose of gr. x. to ʒss. It is rarely, however, given alone; but is added to cathartic and tonic agents, to act as a corrigent to the former, and an adjuvant to the latter. It enters into the composition of the *Pulvis Aloes et Canella* of the Pharmacopœia of the United States.

23. WIN'TERA.—WINTER'S BARK.

This article is in the secondary list of the Pharmacopœia of the United States. It is the bark of *Win'tera Aromat'ica*, *Drymis Win'teri*, or *Winter's Bark Tree;* Sex. Syst. Polyandria Tetragynia; Nat. Ord. Magnoliaceæ; an evergreen tree, which is indigenous along the Straits of Magellan, Chili, Peru, and New Grenada.

The bark of the shops is in quills or rolled pieces; of a pale yellowish or dull reddish-gray colour externally, with red elliptical spots. Internally, it is of a reddish-brown colour; whilst the inner surface of canella, with which it has been confounded, is of a pale colour. Like canella, its main constituent is volatile oil; but, unlike it, it contains tannic acid and oxide of iron.

Its medical virtues are essentially those of canella, than which it is much less used. Dose of the powder, gr. x. to ʒss.

24. CAL'AMUS.—SWEET FLAG.

Calamus, of the Pharmacopœia of the United States, is the rhizoma of *Ac'orus Cal'amus;* Sex. Syst. Hexandria Monogynia; Nat. Ord. Aroideæ;—Acoraceæ (*Lindley*)—an indigenous plant, which grows abundantly in this country, in low, damp places, and along the sides of ditches and streams, and flowers in May and June. It also grows abundantly in many parts of Europe and Asia.

The roots, as they are met with in the shops, are of various lengths, flattened, and of the breadth of the fingers; they are of a yellowish-brown colour, and, on the under surface, there are numerous dark points, whence the roots arise; the texture of the rhizoma is spongy or corky, and the fracture short and rough.

The odour is strong and rather fragrant; the taste aromatic, warm, and bitterish. On distillation with water, it yields an essential oil—the *oleum calami aromatici* of the shops, on which its medical virtues essentially depend; but it is never used in medicine. It is said to be used by the wholesale dealers in perfumery, and to be bought by snuff-makers, with the view probably of scenting snuff. (*Pereira.*)

In addition to the essential oil, calamus has been found also to contain resin and extractive, the latter of which has an acrid and sweetish taste.

Calamus is not much used in medicine; it appears, however, to have risen in estimation with the framers of the Pharmacopœia of the United States, who, in the last edition (1842), have elevated it from the secondary to the primary list.

Its properties, being mainly dependent upon essential oil, its virtues are yielded to water; and in the form of *infusion*, (*Calam.* ℥j; *Aq. bullient.* Oj: dose, a wine-glassful,) it may be given as a stomachic and carminative in atonic conditions of the digestive organs,—but it does not seem to be possessed of any virtues, not equally possessed by the other articles of the class. A recent writer (*Pereira*) considers it to be especially serviceable in gouty subjects.

The dose of the powder is from ℈j to ʒj.

It need scarcely be repeated, that decoction is objectionable in every case, where the medical properties are dependent wholly or in part on essential oil.

25. PIMEN'TA.—PIMENTO.

Pimento, *Allspice* or *Jamaica Pepper* is the unripe berry of *Myrtus Pimen'ta* or *Euge'nia Pimen'ta;* Sex. Syst. Icosandria Mynogynia; Nat. Ord. Myrtaceæ—a native of the West Indies, and particularly abundant in Jamaica, whence one of its names. It is a native, likewise, of Mexico and South America. When the fruit has attained its full size, but is yet green, it is gathered and dried.

The quantity on which duty was paid in England, in 1839, was 277,185 lbs. (*Pereira.*)

The taste of allspice, which is a familiar spice, is pungent, slightly astringent, and mixed, like the odour, which is aromatic, and resembles a mixture of cinnamon, nutmeg and cloves. It imparts its flavour to water, and all its virtues to alcohol. The analysis of the berries by Bonastre furnishes a variety of constituents, but those, on which the medical properties are dependent, are a volatile oil—separable into two oils, one lighter and the other heavier than water; and a green oil or resinous matter, which has an acrid burning taste, and contributes to the activity of the pimento. Except in odour, the properties of the volatile oil appear to be almost identical with those of the oil of cloves.

Pimento possesses the medical properties of the other spices. It is a warm aromatic excitant;—not often administered alone; but chiefly used as an adjunct to other medicines, to communicate flavour, or to correct griping or nauseous properties. It is in extensive use as a condiment.

The dose of the powder is from 10 to 40 grains.

O'LEUM PIMEN'TÆ, OIL OF PIMENTO, is obtained by submitting allspice, bruised, to distillation with water. The allspice yields about 4.37 per cent. of oil—heavy and light together. (*Pereira.*) Its colour is reddish-brown; its odour very fragrant, and both that and the taste are those of the pimento, but in an increased degree. Its specific gravity is greater than that of water, averaging 1.021.

It is employed medicinally in the same cases as the other aromatics and volatile oils. Dose, from ♏ij. to ♏x.

An *Aqua Pimentæ* may be formed with the oil in the same manner as the *Aqua Cinnamomi* (q. v.)

SPIRITUS PIMENTÆ, SPIRIT OF PIMENTO. (*Piment.* cont. ℥ij; *Alcohol. dilut.* cong.; *Aquæ*, Oj; distil a gallon.) It has the same medical qualities as the ordinary aromatic spirits. Dose, f. ʒj. to f. ʒiij.

26. PIPER.—BLACK PEPPER.

The berries of black pepper—*Piper nigrum*—Sex. Syst. Diandria Trigynia; Nat. Ord. Piperaceæ, (*Kunth*)—are the only officinal pepper in the Pharmacopœia of the United States. They possess, however, all the virtues of the class. The plant is cultivated in various parts of India, and the Islands, and likewise in the West Indies; but Europe and America derive their main supplies from Sumatra and Java. In 1840, the quantity which paid duty on importation into England was 2,271,174 lbs.—(*Pereira.*)

The berries are gathered before they are perfectly ripe; and, on being dried, become black and wrinkled; but this applies only to the outer surface, which, when removed, leaves the *white pepper—piper album*, which is a more delicate spice, not containing the same proportion of active ingredient.

Pepper-corns are of the size of small peas, have an aromatic odour, and a fiery, pungent taste, which is dependent upon essential oil. Accordingly, their virtues are yielded to alcohol, and—in a less degree—to water. On analysis, they have been found to yield, 1. Resin of Pepper, a very acrid substance, possessing in a great degree the acrid properties of the peppers, soluble in alcohol and ether, but not in volatile oils. 2. Volatile Oil of Pepper—having the odour and taste of pepper. 3. Piperin, found in all the peppers, and described under the head of Tonics.

The medical properties of pepper are essentially those of capsicum, than which it is less acrid. Like it, it is extensively used as a condiment. In atonic conditions of the stomach, as in the gouty, it is occasionally given to check nausea, or to remove flatulence, but it is not often prescribed—partly, perhaps, owing to familiarity with it as a condiment constantly on the table having prevented it from receiving as much attention as it otherwise might have done. It has been prescribed occasionally in place of cubebs for gonorrhœa, and the other mucous inflammations for which the latter remedy has been advised.

A watery *infusion* has been found serviceable in relaxed sore throat, and it has occasionally been employed as an excitant in paralysis of the tongue. Formed into an *ointment*, it has been used in tinea capitis, and with this view an UNGUENTUM PIPERIS NIGRI, (*Adipis*, ℔j; *Piper. nigr.* in pulv. ℥iv.) is officinal in the Dublin Pharmacopœia, but it has to be employed with caution, and is scarcely ever used on this side the Atlantic.

The dose of black pepper is from gr. v. to gr. xv. It may be administered either in the berry or in powder. In the latter case, it may be made into pills.

A nostrum, called *Ward's Paste*, acquired much celebrity in piles, fistulæ, and chronic affections of the rectum; and, in consequence, a substitute was introduced into the British Colleges under the name CONFECTIO PIPERIS NIGRI. It has received high testimony in its favour, and would seem to have been beneficial in diseases of the lower part of the bowels, in which an excitant is indicated. Sir Benjamin Brodie asserts, that it has sometimes proved successful in severe cases of piles, by mixing with the fæces, and coming in contact with the diseased parts. It consists of black pepper, elecampane root, fennel seed, honey and sugar.

27. CAP'SICUM.—CAYENNE PEPPER.

Cayenne Pepper is the fruit of *Cap'sicum an'nuum;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Solaneæ;—Solanaceæ, (*Lindley*,)—a native of the warmer regions of Asia and America, and extensively cultivated in Europe and this country. The recent fruit, called *Chillies*, is sold for pickling; and the dried fruit of the druggists bears the same name.

There are different varieties of capsicum, which produce a fruit varying in shape; but the oblong varieties are those that are chiefly used medicinally. The fruit, when perfectly ripe, dried, and reduced to powder, forms '*red pepper*,' or *Cayenne pepper*.

The odour of capsicum is aromatic and pungent; the taste very biting, hot, and aromatic. Its virtues, which have been considered to be dependent upon a peculiar principle, called *capsicin*, are yielded to ether, alcohol and water. (*Bucholz.*) The following is the analysis of Braconnot:—Acrid oil, (*capsicin*,) 1.9; wax with red colouring matter, 0.9; brownish starchy matter, 9.0; peculiar gum, 6.0; animalized matter, 5.9; woody fibre, 67.8;

salts, (citrate of potassa, 6.0; phosphate of potassa, and chloride of potassium, 3.4;)—9.4.—Total, 100.

The action of capsicum, taken internally, is excitant; and when applied to any portion of the cutaneous surface, it is rubefacient, and, consequently, revellent. If taken in an overdose, it may cause inflammation of the stomach; but it is not easy to conceive, that a sufficient quantity to produce this effect could be readily taken, in consequence of its acrid action upon the mouth. It is a well known condiment; and, in the East Indies, is used in very large quantities, without any disagreeable results. A friend of the author has seen one, who had resided for a long time in Hindusthan, eat it upon bread and butter—the layer of the pepper being as thick as that of the latter. In those climes, the effect of the elevated temperature has an injurious influence on the function of innervation; digestion is accordingly imperfectly performed, and excitant condiments are greatly indulged in.

Capsicum is not often administered as a general excitant; but it is highly appropriate, wherever there is defective impressibility of the stomach. In cases of malignant cholera, and in the low stages of fever, it is occasionally prescribed by some; but it is more frequently employed in asthenic dyspepsia—as in that, which occurs in atonic gout, or in the habitual drunkard. It has, also, been prescribed in paralytic and lethargic cases; but the internal use of excitants must be used in such cases with caution,—for fear, that the pathological condition, which is usually hemorrhage into the encephalon, or vascular hyperæmia, should be augmented by it. It has, likewise, been advised as an adjunct to sulphate of quinia in intermittents, in which there is great want of gastric impressibility. It is most commonly, however, used as a local excitant, especially in cases of malignant or sluggish sore throat; and its good effects in scarlatina maligna have been deposed to by many excellent observers. The author has occasionally seen asthenic or sluggish sore-throat aggravated by it; but, at other times, benefit has resulted from it.

In cynanche maligna—including in the term the cynanche of scarlatina maligna—it is given by some internally at the same time. The following form is one that is often used as a gargle. (*Capsic.* in pulv. ʒj; *Sodii chlorid.* ℈j; *Aceti,* ʒss; *Aquæ ferventis*, f. ℥vj. Infunde et cola.) In relaxed conditions of the throat or uvula, it may be applied also in the form of tincture by means of a camel's hair pencil.

As a rubefacient, capsicum is used wherever cutaneous revellents are considered to be indicated,—as in the delirium or coma of fever; but in such cases sinapisms are generally preferred. It may be made into a cataplasm in the same manner as mustard, and be applied to the lower extremities; or it may be mixed with heated spirit, and used as a lotion. In similar cases, as well as when the circulation does not go on actively in the lower limbs, as shown by cold feet, woollen socks may be dusted with the powder. In neuralgic pains, the same applications are often beneficial; and in the cold stage of cholera, where frictions were indicated, the cayenne pepper was often added to the ointments used for this purpose. It formed a common adjunct to the Unguentum hydrargyri.

The capsicum cataplasm is not so apt to vesicate as the sinapism.

The dose of capsicum powder is from three grains to ten, which may be made into pills with crumb of bread; or—especially in cases of atony of the stomach—with extract of gentian. (*Pulv. capsic.*, *Ext. gentian.*, āā ℈j; *Aquæ*, q. s.; ut fiant pilulæ xij. Each pill will contain about two grains of capsicum.)

In cases of cynanche, the gargle before recommended may be used, or a simple infusion of capsicum. (*Capsic.* in pulv. ʒss; *Aquæ ferventis*, Oj); or a mixture of the tincture of capsicum and water. (*Tincturæ capsici*, f. ℥ss; *Aquæ*, f. ℥viij.)

TINCTU'RA CAP'SICI, TINCTURE OF CAYENNE PEPPER. (*Capsic.* ℥j; *Alcohol. dilut.* Oij.) The dose of the tincture of cayenne pepper is from x♏ to f. ʒj or more, in the cases before mentioned. It is likewise employed occasionally to cover the taste of oil of turpentine, as well as to prevent the nausea which the oil might induce; and is sometimes used as a rubefacient, when evaporated to the consistence of an extract, and spread over the part.

28. CUBEB'A.—CUBEBS.

Cubebs are the berries of *Piper cubeb'a;* Sex. Syst. Diandria Trigynia; Nat. Ord. Piperaceæ. This species of pepper is a native of Java and Prince of Wales Island, but flourishes, also, in India and Guinea.

It is the dried unripe fruit. It resembles black pepper, except that it is lighter coloured, and each pepper-corn is furnished with a short stalk, which has given it the name *Piper caudatum.* Within the hard shell is a spherical seed, which is whitish internally, and oily. The odour of cubebs is aromatic; the taste pungent, like pepper, and camphoraceous.

The active ingredient of cubebs is the volatile oil,—**OLEUM CUBEB'Æ**—which is separated by distillation, is officinal in the Pharmacopœia of the United States, and is regarded by some as the best and most convenient preparation of cubebs. (*Pereira.*) The analysis of cubebs by Monheim afforded the following results—green volatile oil, 2.5; yellow volatile oil, 1.0; cubebin, probably the same as piperin, 4.5; balsamic resin, 1.5; wax, 3.0; chloride of sodium, 1.0; extractive, 6.0; lignin, 65.0; loss, 15.5.—total, 100.00.

The action of cubebs on the economy is, in many respects, like that of copaiba. It has, also, the general excitant properties of the peppers, but is rarely administered except in diseases of the genito-urinary mucous membrane, on which its action is like that of copaiba, probably through the operation of its essential oil, which is separated from it, passes into the mass of blood, and is separated along with the urine by the kidney. Like copaiba, too, in over-doses, it is apt to induce urticaria, and to excite inflammation of the gastro-enteric mucous membrane.

In gonorrhæa, it is given under the same circumstances as copaiba; and like that agent, in violent inflammatory cases, and in the early stages of ordinary cases, it may be injurious. There are numerous instances on record, in which unpleasant consequences —as orchitis, and cystitis—have resulted from its improper administration. Many practitioners, however, give it in every stage of the disease.

In gleet, and chronic inflammation in general of the mucous membrane of the urinary organs, its employment is more appropriate. It has been advised, also, in the gonorrhœa of the female, as well as in leucorrhœa; but here its efficacy is more limited, and some, indeed, deny it to have any.

It is affirmed, that in abscesses of the prostate, benefit has resulted from the gentle stimulus it has afforded; and in hemorrhoids, its agency has been likewise found beneficial. In most respects, indeed, its action resembles that of copaiba, (q. v.) In one respect, there would appear to be a difference between them. Copaiba is said to have induced chronic rheumatism, whereas cubeba has been administered in that disease, and, it is said, advantageously.

Cubeba is commonly prescribed in gonorrhœa in powder, and in doses of one, two, and even four drachms, repeated once or oftener in the day. In affections of the bladder and prostate, the dose is generally less,—from ten to thirty grains. Electuaries, lozenges and boluses have likewise been prepared with it; but there seems to be no great advantage in these formulæ. (See the author's *New Remedies*, 3d edit., p. 192. Philad. 1841.)

In consequence of the gastric irritation sometimes produced by it, it has been proposed, that, like copaiba, it should be given in enema, to the amount of one or two drachms or more of the powder, suspended in five or six ounces of an oleaginous mixture.

It is advisable to keep the bowels open during its use, for when hardened fæces are permitted to accumulate, the spice insinuates itself into the mass, and occasions excoriations of the rectum. (*Paris.*)

TINCTU'RA CUBEB'Æ, TINCTURE OF CUBEBS. (*Cubeb.* contus. ℥iv; *Alcohol. dilut.* Oij. It may also be made by the process of displacement.) The dose of this tincture is one or two fluidrachms. It is occasionally, though rarely, used as a carminative; but is not unfrequently employed in gonorrhœa.

The volatile oil—**OLEUM CUBEB'Æ**—is, likewise, much used by many practitioners in the same disease. Its dose is 10 or 12 drops, suspended in water by means of mucilage, or dropped on sugar.

On the continent of Europe, an *oleoresinous extract of cubebs* —prepared by adding the oil to the resinous extract of cubebs which is made by digesting the cake left after the distillation of the oil in alcohol, and distilling off the spirit—is occasionally used in gonorrhœa; as well as an *ethereal hydro-alcoholic extract of cubebs*, but they do not seem to be preferable to the preparations already indicated. (*New Remedies*, loc. citat.)

29. SINA'PIS.—MUSTARD.

Mustard is a well-known acrid stimulant, used as a condiment to facilitate the digestion of other substances, but rarely employed internally as a therapeutical agent. It is chiefly used in the form of cataplasm as a revellent; and frequently as an excitant to the wrists, ankles, or epigastrium, where the powers of the system are much prostrated, as in adynamic fevers, and other diseases of a similar character, in which it is greatly preferable to blisters; as the latter abstract from the system a quantity of serum, which can scarcely fail to antagonize the good effects, that might follow from the excitation. Occasionally, too, mustard is added to pediluvia, to render them more excitant. The mode of formation and application of the cataplasm is given elsewhere. (See REVELLENTS.)

When it is desired to exhibit mustard internally as an excitant, *mustard whey* may be given, which is prepared by boiling half an ounce of the bruised seeds or powder in a pint of milk, and straining. The dose is f. ℥iv., two or three times a day.

The volatile oil—OLEUM SINAPIS—has been occasionally used as a local excitant; but more frequently as a rubefacient and vesicant.

30. ZIN'GIBER.—GINGER.

The rhizoma of *Zin'giber officina'lē*, *Amo'mum Zingiber* or *narrow-leaved Ginger;* Sex. Syst. Monandria Monogynia; Nat. Ord. Zingiberaceæ (*Lindley*), is officinal in the various pharmacopœias of Great Britain and of this country. Its native soil is doubtful,—supposed to be Asia; but it is now cultivated in most tropical regions throughout the globe. The young shoots put forth in the spring are used in the preparation of the well-known preserve—*preserved Ginger*. At the end of the year, or beginning of the next, when the herb has withered, and before the root becomes too woody, the rhizoma is in the fittest state for yielding the ginger of the shops; which is prepared by picking and cleaning the rhizomes, and then either scalding them in boiling water, and drying them with artificial heat, or by peeling and drying them in the sunshine without immersion in hot water. In the former mode, *Black Ginger* is said to be obtained; in the latter *White Ginger*. Dr. Pereira, however, thinks, that this mode of preparation is insufficient to account for the difference between the black and the white ginger, and is disposed to suspect the existence of some difference in the plants themselves. When imported into England, the common kinds are bleached by washing them in a solution of chlorinated lime, and, sometimes, by exposing them to the fumes of burning sulphur,—processes which cannot fail to injure the aromatic. (*Pereira.*)

Black ginger is imported into this country almost exclusively from Calcutta, and is called by the druggists *East India ginger;* white ginger is imported from England, where it is said to undergo some preparation. It is generally termed *Jamaica ginger*, and is the most prized. (*Wood & Bache.*) In England, the quantity of ginger on which duty was paid, in the year 1840, was 9,063 cwts.; of which 7,528 cwts. were imported from the British West Indies; and 1,535 from the East Indies. (*Pereira.*)

Black ginger, as found in the shops, has a wrinkled epidermis, and is of a dirty grayish-brown colour externally. The outer portion is horny; the centre of a whitish colour, and somewhat farinaceous. White ginger is destitute of the epidermis; of a pale grayish-yellow colour, and of a more farinaceous texture.

When subjected to analysis, ginger has afforded, as main constituents, a volatile oil; and a soft resin. Its starch has been separated, of fine quality, and perfectly white, to the amount of more than 25 per cent., by the ordinary process for procuring arrow-root.

Ginger is one of the most prized of the aromatics, and as such is used as a condiment. It is rarely given alone, except in domestic practice, when it is often taken in the form of *ginger tea*, in tormina, and in gastric and intestinal flatulency. Therapeutically, it is more frequently used than any other aromatic, as a corrigent to substances, which are apt to excite nausea, gastrodynia or tormina. It is occasionally used, as a collutory and gargle in relaxation of the uvula, and in relaxed sore throat; and, at times, is applied as an excitant and rubefacient to the skin; but it is inferior to mustard, and is, therefore, rarely applied.

The dose of the powder, as an excitant, is from gr. x. to gr. xx. or more. The *infusion—ginger tea*—may be made of from ʒij. to ʒiv. of ginger to Oss. of boiling water; sweetened, and taken in doses of one or two table-spoonfuls.

TINCTU'RA ZINGIB'ERIS, TINCTURE OF GINGER. (*Zingib.* contus. ℥viij; *Alcohol.* Oij,—prepared by maceration or by displacement.) Tincture of ginger is an excellent carminative. It is rarely, however, given alone; but is an excellent adjunct to tonic and cathartic mixtures. It is chiefly used in the preparation of the

SYRU'PUS ZINGIB'ERIS, SYRUP OF GINGER. (*Tinct. Zingib.* f. ℥iv; *Syrup.* cong.) A syrup may, also, be made extemporaneously by mixing *tincture of ginger* with *simple syrup.* It is added to tonic and cathartic mixtures to prevent flatulence, and give flavour. It is much used, likewise, as an addition to the common soda water as drunk at the fountain.

Ginger enters into the composition of the *Acidum Sulphuricum aromaticum*, the *Pulvis aromaticus*, the *Tinctura Cinnamomi composita*, and the *Vinum Aloes* of the Pharmacopœia of the United States.

31. ARMORA'CIA.—HORSERADISH.

Horseradish—whose general properties have been described elsewhere (p. 265)—is a well known excitant condiment, when fresh; and is adapted therefore to act as an internal, as well as an external excitant: it is likewise, to a certain extent, diuretic; but it is rarely employed in medicine; and Dr. Christison has remarked, that "on the whole, it might be expunged from the pharmacopœias with little inconvenience."

The dose, as an excitant, when scraped into shreds, is ʒss. or more.

The Pharmacopœia of the United States has an

INFU'SUM ARMORA'CIÆ, INFUSION OF HORSERADISH. (*Armorac.* incis. *Sinapis*, contus. āā ℥j; *Aq. bullient.* Oj.) The infusion is rarely prescribed. It has been advised in chronic rheumatism, paralysis, and in dropsies of an asthenic kind. The dose is f. ℥ss. to to f. ℥ij. two or three times a day.

32. TEREBIN'THINA.—TURPENTINE.

The term turpentine is usually given to vegetable juices, liquid or concrete, which consist of resin, and a peculiar volatile oil, separable by distillation, called *Oil of Turpentine.*

The only turpentines, that are officinal in the Pharmacopœia of the United States, are **TEREBIN'THINA, TURPENTINE,** the juice of *Pinus Palustris, Long-leaved Pine, Yellow Pine, Pitch Pine, Swamp Pine,* and other species of Pinus. SEX. SYST. Monœcia Monadelphia; NAT. ORD. Coniferæ; and **TEREBIN'THINA CANADEN'SIS;** *Canada Turpentine, Canada Balsam,* or *Balsam of Fir,* the juice of *Abies Balsamea, Canadian Balsam Fir, Balm of Gilead Fir, American Silver Fir.*

1. **TEREBIN'THINA,** of the Pharmacopœia of the United States, *American,* or *White Turpentine*—the juice of *Pinus Sylvestris,* is not identical with the common European turpentine, which is, also, the produce of *Pinus Sylvestris, Wild Pine,* or *Scotch Fir.* It is chiefly obtained from Virginia and North Carolina, and is procured as follows. In the winter months, holes are made in the trunk of the tree, three or four inches from the ground, which are capable of holding two or three pints, or more, into which, in the spring, the juice begins to flow, and continues through the summer and autumn. The juice is removed from these holes as they fill, and is transferred into casks, in which it acquires the consistence of a soft solid. The quantity of raw turpentine used by the turpentine distillers of Wilmington, N. C. alone, is astonishing. It is stated in the North Carolina Chronicle, published in that town, that there are three establishments, which work up about 200 barrels a day, making between 62,000 and 63,000 barrels per annum. 75,000 or 80,000 barrels, it is expected, will be used by the next year, (1843.) Besides, nearly 100,000 barrels were shipped from Wilmington in the year ending the first of July, 1842.

The turpentine procured as above has the odour that is characteristic of all the terebinthinates, a warm, pungent, bitterish taste, and a white colour tinged with yellow. Its consistence varies with the temperature.

2. **TEREBIN'THINA CANADEN'SIS;** or *Canada Turpentine*—the juice of *Abies Balsamea*—is collected in Canada and the State of Maine. Between the bark and the wood of the trunks and branches are vesicles, which contain the turpentine. This exudes when they are broken, and is received into a bottle. When

fresh, it is of the consistence of thin honey, but, by time and exposure, it becomes more and more solid. It is yellow, transparent, very tenacious, possessing the terebinthinate odour in an agreeable form, and having the taste of those substances. In this country, it is usually brought to market in bottles, but it is exported to England in casks. In 1838, the quantity imported into England was 7259 lbs. (*Pereira.*)

Both these turpentines yield 17 or 18 per cent. of volatile oil on distillation.

Besides these turpentines, which are officinal in this country, there are others—as 1. the *Common European Turpentine*—TEREBINTHINA VULGARIS—which, as already remarked, is procured from *Pinus Sylvestris;* 2. the *Larch*, or *Venice Turpentine*—TEREBINTHINA VENETA—obtained from *Larix Europæa*, or *Common Larch;* 3. the *Chian*, or *Cyprus Turpentine*—TEREBINTHINA CHIA SEU CYPRIA—obtained from *Pistacia Terebinthus*, or *Turpentine Pistachia;* SEX. SYST. Diœcia Pentandria; NAT. ORD. Terebinthaceæ; 4. the BOURDEAUX TURPENTINE, from *Pinus Pinaster*, or *P. Maritima*, the *Pinaster* or *Cluster Pine*; 5. the *Strasburg Turpentine*, TEREBINTHINA ARGENTORATENSIS, from *Abies Picea*, or *Silver Fir* of Europe; 6. the *Common Frankincense*—ABIETIS RESINA, *Thus*, from Abies Communis; 7. the DAMARRA TURPENTINE, from *Pinus Damarra*, which grows in the East India Islands; and 8. the DOMBEYA TURPENTINE, the produce of *Dombeya Excelsa*, a native of Chili.

All the terebinthinate oleo-resins resemble each other in smell and taste. They soften and become liquid by heat, readily take fire, and burn with a white flame, giving off much smoke, which, in a confined space, occasions a copious deposition of lampblack. They yield, by distillation, a large quantity of volatile oil, leaving a residuum consisting of *resin.* They are readily soluble in alcohol and ether, and unite with the fixed oils. Water extracts only a small portion of the volatile oil, but becomes largely impregnated with its flavour.

All the terebinthinate preparations owe their medical properties to their volatile oil, which, like other volatile oils, is excitant,—occasioning, when swallowed, a sense of heat in the stomach, and, in large doses, nausea, and augmentation of the peristaltic action of the bowels. The essential oil is absorbed into the blood-vessels, operating on the system as an excitant, and passing to the kidneys—partly changed and partly unchanged—where it is separated along with the urine; in small quantities increasing the secretion from those organs, and in larger, giving rise, at times, to nephritic symptoms, to hæmaturia, and to strangury. It is also exhaled from other secerning surfaces, as the skin and mucous membranes generally. Hence it is, that the turpentines have been administered in affections of the mucous membranes in general, and of the urinary organs in particular.

None of the turpentines are, however, much used, in consequence of their virtues being wholly possessed by the volatile oil, under which the diseases will be mentioned in which they are prescribed.

The dose of the turpentines is from a scruple to a drachm. They may be made into *pills* with powdered liquorice; into an *emulsion* with mucilage of gum arabic or yolk of egg, sugar, and mint water; or into an *electuary* with honey or molasses.

If the Bourdeaux turpentine be mixed with about one-twenty-eighth part of its weight of calcined magnesia, it solidifies in about twelve hours,—the acid resins combining with the magnesia, and forming solid resinates, which absorb the volatile oil.

An *emulsion* of the turpentines may also be thrown into the rectum as an excitant injection, when it is advisable to induce catharsis and revulsion at the same time, as in comatose affections.

The turpentines enter into the composition of certain plasters.

a. **O'LEUM TEREBIN'THINÆ, OIL OF TURPENTINE.** This oil is prepared on the large scale, and is, consequently, not in the list of preparations, but in that of the materia medica, of the Pharmacopœia of the United States, as well as of those of Europe. All the turpentines yield it, but in this country it is prepared chiefly from *Pinus Palustris*, which affords about 17 per cent., and from which it is distilled in large quantities in North Carolina, not only for home consumption, but for exportation. The residue in the still, after the distillation of the oil, is *resin.*

In the British colleges, oil of turpentine is directed to be redistilled; but in this country, it can always be had sufficiently pure for medical use; so that the apothecary rarely has recourse to a hazardous process; and, accordingly, no formula for its rectification is given in the Pharmacopœia of the United States.

Pure oil of turpentine is limpid and colourless, having a peculiar penetrating odour, and a hot, pungent, bitterish taste. Its specific gravity is about 0.86. It is highly volatile and inflammable; less soluble in alcohol than most other volatile oils, and very slightly so in water, and in dilute or hydrated alcohol. It is readily soluble in sulphuric ether.

Oil of turpentine is a powerful excitant, diuretic, anthelmintic, and in large doses cathartic; but its excitant properties alone fall under consideration here. In small doses—from a few drops to a drachm—it causes a feeling of warmth in the stomach; is absorbed, and passes off by the kidneys, and the different emunctories; so that the cutaneous and pulmonary transpirations have a marked terebinthinate—and the urine a violet—odour, the latter supposed to be owing to a portion of the oil being decomposed.

Owing to its excitant operation, it proves beneficial in chronic inflammations of mucous membranes accompanied by discharges; and, not unfrequently, even in small doses, causes hæmaturia, and great irritation of the urinary organs. These effects are still more marked, when the dose is larger—from f. ʒj., for example, to f. ʒij. In still larger doses, from f. ʒij. to f. ℥iss., and even more, it induces much concentration of action towards the abdominal viscera; purging at times, and passing off freely by all the excretions, so as to impregnate the air of the chamber;—in some cases, disordering the encephalic functions, but not causing any permanent ill effects. It has been given to the extent of three ounces without injury. (*Duncan.*)

Oil of turpentine is used as an internal excitant in protracted fevers accompanied by typhoid symptoms, especially if, at the same time, there be meteorism or ulceration of the intestines. On most respectable authority, (*Prof. Wood*, of Philadelphia,) it is affirmed, that there is a particular state of fever, usually attended with much danger, in which the remedy has been found uniformly successful:—this is in the latter stages of typhoid fevers, or lingering remittents, "in which the tongue, having begun to throw off its load of fur in patches, has suddenly ceased to clean itself, and become dry and brownish. The skin is at the same time dry, the bowels torpid and distended with flatus, and the patient sometimes affected with slight delirium. Under the use of small doses of turpentine, frequently repeated, the tongue becomes moist and again coated, the tympanitic state of the bowels disappears, and the patient goes on to recover as in a favourable case of fever." Dr. Wood is disposed to ascribe the effect to a healthy change produced by the oil on the ulcerated surface of the intestines; but the author has seen its excitant influence exhibited in similar cases, when there was no reason to believe in the presence of intestinal ulceration.

In similar conditions in yellow, puerperal, and eruptive fevers, the internal use of the oil has been found beneficial.

Like copaiba, oil of turpentine has been found serviceable in cases of chronic dysentery and diarrhœa; in chronic blennorrhœa and leucorrhœa—less so, however, in the last affection, as has been shown to be the case with copaiba (q. v.), and in chronic inflammation of the bladder; but in the last disease its administration requires caution, as it is apt—especially if the quantity be too great—to excite increased irritation.

In chronic rheumatism, it has been more largely employed than any other remedy; and in sciatica, and other neuralgic affections, the benefit obtained from it is often marked. It acts probably, in such cases, as a revellent, by its excitant effects upon the kidneys and urinary apparatus in general.

It is occasionally, but rarely, given as a carminative; the ordinary essential oils appearing to be productive of as much service, whilst they are agreeable, and consequently are preferred.

It can be readily seen, that its excitant action, like that of other essential oils, and local stimulants, may be invoked in many cases, where it is desirable to induce a revellent action, with the view of breaking in upon any diseased condition.

Externally, oil of turpentine is employed extensively as a rubefacient. In protracted and typhoid fevers, it is applied hot or cold to the extremities; and in chronic rheumatism, paralysis, cynanche, puerperal peritonitis, and, wherever it is desirable to excite cutaneous revulsion, it is constantly prescribed, either alone or associated with olive oil, which renders its action milder.

In those cases of extensive burns and scalds, that are accompanied by much constitutional depression, oil of turpentine has been found a most valuable local excitant; as well as in gangrenous conditions in general, where the object is to restore the part from a state of suspended animation.

Oil of turpentine is the principal ingredient in *Whitehead's essence of mustard*, which consists of it, camphor, and a portion of spirit of rosemary, to which is added a small quantity of flour of mustard. This is a celebrated rubefacient application in chronic rheumatism, neuralgia, &c. *St. John Long's liniment*, which acquired so much notoriety about twenty years ago, is said to have consisted of oil of turpentine and acetic acid, held in suspension by yolk of egg.

United with olive oil, (*Ol. terebinthin.* ʒj; *Ol. olivæ*, ʒvij;) and introduced into the meatus auditorius externus on cotton, it occasionally acts beneficially as an excitant, where there has been a deficient secretion of cerumen.

Oil of turpentine is likewise administered in many cases, with marked advantage, in the form of enema. In amenorrhœa, its excitant influence has, in this way, been beneficial by contiguous sympathy. In fevers, accompanied by meteorism, it is often highly serviceable; and in comatose affections, where it is desirable to induce a revellent action on the lower part of the intestinal canal. Its employment in this form has, however, fallen under consideration when treating of CATHARTICS.

The ordinary dose of oleum terebinthinæ, as an excitant in fever, or chronic *catarrhs* of the mucous membranes, and in chronic rheumatism, is from ♏v. to f. ʒj; but even in the smallest doses, it gives occasion, at times, to bloody urine, and to nephritic and vesical irritation. Some, however, administer it in those diseases to the extent of f. ʒj. to f. ʒij.

It may be taken in molasses, or dropped on some aromatic water, to which a hot aromatic or bitter tincture has been added

—as the tincture of capsicum or tincture of gentian—to conceal its taste. It is more commonly, however, given in emulsion, as in the following prescription: (*Ol. terebinthin.* ʒj—ʒiij; *Vitell. ovi*, seu *Mucilag. acaciæ*, ʒiij; *Aquæ menthæ piperitæ*, ℥iv. M. Dose, a fourth part.)

When given in enema, the quantity of the oil may be increased, and water may be substituted for the aqua menthæ piperitæ. A form for an enema of this kind—Enema Terebinthinæ—is officinal in the Pharmacopœias of London, Edinburgh, and Dublin.

LINIMENTUM TEREBINTHINÆ, LINIMENT OF TURPENTINE. (*Ol. terebinthin.* Oss; *Cerat. resin.* ℔j.) This was the liniment originally proposed by Kentish for the treatment of burns and scalds. It is spread upon lint, and kept on until the peculiar inflammation excited by the fire has been removed. It may then be continued, or milder dressings be substituted, as the case may seem to demand. It may, also, be applied in cases of gangrenous or sloughing ulcers, or wherever a topical application of the kind is needed.

b. **RESINA, RESIN** or **ROSIN.** This is the residuum after the distillation of the volatile oil from the turpentine of *Pinus palustris*, and other species of pinus. When the distillation is not carried too far, the resin contains a little water. This is the officinal article—*Resina*—of the Pharmacopœia of the United States—the *Resina flava* or *yellow resin* or *rosin*. If, in a state of fusion, it be strongly agitated with water, it acquires a distinct appearance, and is called *Resina alba* or *white rosin*. This, according to Christison, is the resin of pharmacy; but it is not so in this country. A more continued heat than that prepared in making the yellow rosin, expels the water, and produces *transparent rosin;* and if the process be pushed as far as it can be, without producing a complete alteration of properties, the residue acquires a deeper colour, and is termed *brown* or *black rosin, colophony* and *fiddler's rosin.* If melted rosin be run into cold water, contained in shallow tanks, and a supply of cold water be kept up until the rosin has solidified, a pale yellow product is obtained, called *Flockton's patent rosin.* (*Pereira.*)

Resin, and the resins in general, are insoluble in water, but are dissolved by alcohol, ether, and the essential oils,—the solutions in alcohol and ether affording precipitates on the addition of water. They unite with wax and the fixed oils by fusion, and form soaps with the caustic alkalies.

Yellow resin, as usually met with, is opaque, and of a yellow or yellowish white colour. White resin differs from the yellow in being opaque and whitish,—properties which are owing to the water with which it is incorporated, and which gradually escapes on exposure, leaving it more or less transparent.

Resin is never given internally. Its main use is to form plasters and ointments, to which it is an excitant ingredient, and renders them more adhesive.

CERA'TUM RESI'NÆ, RESIN CERATE, *Basilicon ointment.* (*Resin,* ℥v; *Adipis.* ℥viij; *Ceræ flavæ,* ℥ij.) A mild excitant ointment, to indolent ulcers; to blistered surfaces to keep up a discharge, and to ulcers which follow burns.

CERA'TUM RESI'NÆ COMPOSITUM, COMPOUND RESIN CERATE. (*Resin., Sevi, Ceræ flavæ,* āā ℔j; *Terebinth.* ℔ss; *Ol. lini,* Oss.) This ointment is somewhat more excitant than the preceding. It is employed in some parts of the United States, under the name of *Deshler's salve.*

33. COPA'IBA.—COPAIBA.

The juice of *Copaïf'era officina'lis,* and other species of *copaifera,* Sex. Syst. Decandria Monogynia; Nat. Ord. Leguminosæ, natives of South America, is commonly known under the name *Balsam of Copaiva,* or *Copaiva Balsam.* It is obtained by making incisions into the stems of the trees, from which it flows copiously; and the incisions are repeated several times in the course of the season. It would seem to be collected in greatest quantity in the province of Para, in Brazil, and is imported into the United States almost wholly from the port of Para, in small casks or barrels. (*Wood & Bache.*) A considerable quantity is imported into England through New-York. (*Pereira.*)

Copaiba is a yellowish transparent liquid, of the consistence of syrup or olive oil, and of a specific gravity varying from 0.950 to 1000; rarely, perhaps, as high as the latter, unless after long keeping. Its odour is peculiar, and taste somewhat pungent, bitterish and nauseous. It is not soluble in water, but is wholly so in alcohol, ether, and the fixed and volatile oils. With the alkalies it forms a soap, which is insoluble in water. (*Pereira.*)

The tests of its purity, as laid down by the Edinburgh College, are the following: "transparent; free of turpentine odour when heated; soluble in two parts of alcohol; it dissolves a fourth of its weight of carbonate of magnesia, with the aid of a gentle heat, and continues translucent." It is not, however, often adulterated in this country.

The chief constituents of copaiba are volatile oil and resin. It contains no benzoic acid, and is, therefore, not properly a balsam, under the modern definition of the word. It more nearly resembles, in its chemical and medicinal properties, the turpentines. By distillation, a volatile oil—Oleum Copaibæ—is obtained from it, which is officinal in the Edinburgh Pharmacopœia, and is preferred by some, as a medicinal agent, to any other form of preparation.

The quantity of volatile oil varies according to the specimen of copaiba, but the average produce has been estimated at from 40 to 45 per cent. (*Pereira*). After the oil has passed over, a resin of copaiba remains, which consists of two resins—one called *Copaivic acid*, and the other *Viscid resin of Copaiva;* but these last constituents are of no pharmacological interest. The following analyses are cited by Pereira:

	Stoltze's Analysis.	*Gerber's Analysis.*	
		Fresh Balsam.	Old Balsam.
Volatile oil,	38.00	41.00	31.70
Yellow hard resin (*Copaivic acid,*)	52.75	51.38	53.68
Brown soft resin,	1.66	2.18	11.15
Water and loss,	7.59	5.44	4.10
Balsam of Copaiba,	100.00	100.00	100.63

It is not many years since it was discovered, that if magnesia be triturated with copaiba, and the mixture be set aside, it will gradually assume such a consistence as to admit of being made into pills; a formula for which is officinal in the Pharmacopœia of the United States.

The effect of copaiba on the human frame, like that of the oleo-resins—as the turpentines—is unquestionably excitant. It occasions, when swallowed, a sense of heat in the pharynx, œsophagus and stomach, giving rise to eructations of the characteristic flavour of copaiba, and, in over doses, to nausea and vomiting. With some persons, indeed, the smallest quantity produces those effects, which is a strong objection to its administration in an uncombined form.

It is, also, apt to induce a form of urticaria through sympathy with the gastro-enteric irritation which it occasions. This passes away, however, when the copaiba is discontinued.

The action of copaiba is not confined to the gastro-enteric mucous surfaces. It is presumed, by many, to affect, more or less, all the mucous surfaces, and, accordingly, is extensively employed in chronic inflammations of those expansions. The oil is likewise taken up into the blood-vessels of the stomach and intestines, and proceeds to the kidneys, where it is separated along with the urine; and excites, at times, nephritis, hæmaturia, and ischuria, with occasional irritation of the urethral mucous membrane. It is, likewise, exhaled along with the pulmonary transpiration, as its odour is distinctly perceptible in the breath. Where unusual doses of copaiba are taken, all those symptoms are greatly aggravated. It is affirmed, too, that under its use pains of a rheumatic character have supervened, which there was great reason to ascribe to its agency.

The principal therapeutical employment of copaiba is unquestionably in inflammatory affections of the genito-urinary organs, and especially in gonorrhœa. In the last disease, it probably acts mainly as a revellent by the impression which it makes on the mucous membrane of the stomach and intestines, and likewise, on the kidney; and it is not improbable, in the more chronic forms of mucous discharge, that the excitant virtue of the oil, which becomes separated with the urine, may exert a beneficial agency on the diseased surface with which it comes in contact. With most modern writers, indeed, copaiba is one of the main agents in the revellent treatment of gonorrhœa. The author has elsewhere stated (*Practice of Medicine*, ii. 435, Philada. 1842), that after the active symptoms of gonorrhœa have passed away under a simple antiphlogistic management, the revellent treatment becomes advisable, which consists in the administration of substances, that, either by their operation on the kidneys, or on the diseased mucous membrane itself, induce a new action in it. Many practitioners are in the habit, however, of administering copaiba freely from the very first, paying no regard whatever to any antiphlogistic treatment; but although this plan may prove successful occasionally, it has been found at times to augment the inflammatory symptoms, and the discharge. Its efficacy is, doubtless, more appropriate, and its employment more philosophical, when prescribed after an appropriate antiphlogistic treatment.

In the gonorrhœa of females, copaiba and the different revellent antigonorrhœal remedies appear to be of limited efficacy. Gonorrhœa in the female,—in reality, affects the vagina rather than the urethra, and we can, therefore, comprehend, that the effect of its revulsive agency on the kidney may be less marked than when the disease is confined to the lining membrane of the urethra, as in the male.

In chronic inflammation of the bladder, copaiba has been prescribed, but its effects have to be watched, or it may add materially to the inflammation.

As in gonorrhœa of the female, so in leucorrhœa it cannot be expected, that copaiba could afford essential benefit. Cases, indeed, are recorded of advantage from it, but it is not much relied on. The same may be said of its use in chronic bronchitis, in which it has been extolled by many practitioners. Its agency, in such cases, also, is probably revellent by exciting the lining membrane of the stomach.

It can scarcely be expected, that the small quantity exhaled along with the bronchial or pulmonary transpiration, can exert much agency. This is a topic, however, which is investigated under the head of EXPECTORANTS.

In cases of chronic inflammation of the mucous membrane of the bowels, more effect may be expected from it, inasmuch as it can come into immediate contact, with the seat of the disease. It is true, that where this is low down in the bowels, the copaiba will be probably despoiled of the greater portion of its oil, before it reaches it; but still sufficient may remain, and the resin of copaiba will certainly pass through the bowels. Strong testimony has been adduced by a respectable physician, (*La Roche*, of Philadelphia,) in favour of its beneficial influence in cases of chronic inflammation of the colon and rectum, and it is said to have been useful in hemorrhoids, both when employed in small doses internally, and when applied to them externally, after the activity of the inflammatory stage had passed away.

Like the balsams, it has occasionally been used as an excitant to ulcers, but at the present day is rarely, if ever, employed. It has also been found serviceable as a topical application in chilblains. (*Ruschenberger*, U. S. N.) These are the chief cases in which its excitant agency has been employed.

The ordinary dose of copaiba is from ♏x. to f. ʒj, and even more, two or three times a day. It is commonly given dropped on sugar; but its taste is so repulsive, that it is often advisable to adopt other forms with the view of concealing it, and at the same time of correcting its effects upon the digestive organs. The following is an unpharmaceutical compound, which has often been prescribed in gonorrhœa; the spirits of nitre and lavender being added to correct the taste, and the opium to prevent nausea or catharsis. (*Copaib.*, *Sp. Æther. nitric.* āā ℥ss; *Acaciæ, pulv.*, *Sacchari*, āā ʒj; *Sp. Lavandul. comp.* ʒij; *Tinct. opii.* ʒj; *Aquæ destillat.* ℥iv.—M. The dose of this is a table-spoonful three times a day.) Many of the more recent writers, however, prefer to give it alone, in wine or lemonade, or dropped in a wine-glassful of water to which a little compound tincture of gentian has been added.

Where copaiba is given from the commencement of the disease, it is usually prescribed in the dose of a fluidrachm or more, two or three times a day; and with the view of cutting it short at the very onset, it has been proposed, to administer as much as from f. ʒij. to f. ℥j. for a dose. (*Ribes.*)

Occasionally, it is administered in the form of emulsion, made with mucilage, not too thick; or yolk of egg, the vehicle being cinnamon, peppermint or other aromatic water.

PILULÆ COPAIBÆ, PILLS OF COPAIBA. (*Copaib.* ℥ij; *Magnes.* recentè præparat. ʒj; mix and set aside, till the mixture concretes into a pilular mass, to be divided into 200 pills.) Each of these pills contains between four and five grains of copaiba, so that from two to six or more may be given for a dose, two or three times a day.

In the Edinburgh Pharmacopœia, the OLEUM COPAIBÆ is officinal. This is preferred, by some, to any preparation of copaiba. (*Pereira.*) The usual dose is from ten to twenty drops, but Dr. Pereira states, that he has known f. ℥ij. taken at once without any injurious consequences. It may be dropped on a lump of sugar; but it is not much used in this country.

Capsules made of gelatine and inclosing copaiba have been introduced, with the view of obviating the taste. Each of these usually contains about ten grains of the copaiba; and is of a size, which can generally be swallowed without difficulty. The capsule is digested. The process for their formation is a secret.

Copaiba has also been administered in enema, and it is affirmed on good authority, (*Velpeau,*) that this form may be substituted in all cases, in which its employment is considered to be indicated. The author has never used it in this manner. It has been proposed to introduce the gelatinous capsules into the rectum, but it is not easy to see, why a comparatively expensive form of preparation should be employed,—seeing that the reasons, which suggested the use of the capsules, cannot apply to the administration of copaiba by the rectum.

34. O'LEUM CAJUPU'TI.—CAJEPUT OIL.

Cajeput oil is the volatile oil of the leaves of *Melaleu'ca caju-pu'ti;* SEX. SYST. Polyadelphia Icosandria; NAT. ORD. Myrtaceæ. It is in the secondary list of the Pharmacopœia of the United States.

The species of melaleuca, from which the oil is obtained, is a native of the Moluccas. The oil is procured from the leaves by distillation, chiefly at Amboyna and Bourou, and is usually imported from India in green glass bottles, similar to long-necked beer bottles. In the year 1834, it was much extolled in England in cases of cholera, in consequence of which a great demand was caused for it, and the price rose from two to fourteen shillings an ounce. Various imitations accordingly appeared in the market. One of these consisted of oil of rosemary, flavoured with camphor and oil of cardamom, and coloured. (*Pereira.*) It would not seem, however, that it is often adulterated.

The appearance of the oil is limpid, and of a green colour; but, when rectified, it is colourless. Its odour is strong and penetrating, and resembles that of a combination of camphor, rosemary and cardamom. The taste is warm and pungent.

Like the other essential oils, cajeput oil is excitant; but as its impression is more powerful on the gustatory nerves than the aromatic oils in general, it has been employed, likewise, as an excitant antispasmodic. It acts as a diffusible stimulant, and hence is adapted not only for cases of flatulent colic and tormina, like the essential oils in general, but both in India and in Europe and this country has been used in low protracted fevers, and in paralytic affections: it is not much employed, however, and appears not to be possessed of any virtues that especially recommend it as an internal excitant. As a local excitant, it is more frequently used;—in cases, for example, of paralysis of the tongue; and is introduced into the hollow of the tooth, in carious odontalgia. It is, likewise, used as an embrocation, when mixed with an equal portion of olive oil, in chronic rheumatism, and painful affections in general, local paralysis, &c.; but even for this purpose, it does not appear to possess any virtues over other excitant agents—as the terebinthinates.

The dose of the oleum cajuputi is from one to five drops or more, on sugar, or formed into a mixture.

35. SUC'CINUM.—AMBER.

Amber is found in various parts of the world, but the principal portion of that which is met with in commerce is cast ashore on the coast of the Baltic between Königsburg and Memel. It is supposed to be disengaged from lignite by the action of the sea. (*Pereira.*) It has been found in Maryland and New Jersey,—in the former state, associated with iron pyrites and lignite. The amber, however, which is used in this country, is imported from the shores of the Baltic. (*Wood & Bache.*)

Amber usually occurs in irregularly shaped pieces, of a pale golden yellow, but, occasionally, of a reddish-brown, and even deep-brown colour. It is insipid, and inodorous, except when heated or rubbed, when it exhales a peculiar, aromatic, not disagreeable smell. It is usually translucent; at times, opaque or transparent. Its specific gravity is about 1.078. It is brittle, having a conchoidal fracture. It is insoluble in water, and very slightly acted on by alcohol.

When subjected to examination, its proximate constituents are found to be volatile oil, two resins, a bituminous substance, and a peculiar acid, called the *succinic.*

Amber is possessed of excitant properties, and was formerly given in the dose of 10 grains to ℈j. in powder. It is never, however, used in this country, except in pharmacy and the arts.

O'LEUM SUC'CINI, OIL OF AMBER. (*Succin.* in pulv. q. s. Put the amber, previously mixed with an equal weight of sand, into a glass retort, which is to be only half filled; distil by means of a sand bath, with a gradually increasing heat, an acid liquor, an oil, and a concrete acid impregnated with oil. Separate the oil from the other matters, and keep it in well stopped bottles.)

O'LEUM SUC'CINI RECTIFICA'TUM, RECTIFIED OIL OF AMBER. (*Ol. succin.* Oj; *Aquæ*, Ovj. Distil until four pints of the water have passed with the oil into the receiver; then separate the oil, and keep it in well-stopped bottles.)

The oil of amber, as found in the shops, has a strong, peculiar odour, and a pungent acrid taste. It is nearly colourless, when first redistilled, but gradually becomes brown. It is soluble in absolute alcohol in all proportions, and imparts its properties, in some degree, to water.

It is a nauseous excitant, and possesses the usual properties of the essential oils; but on account of the powerful impression it makes on the gustatory nerves also, it has been prescribed as an antispasmodic, in the dose of from ♏ij. to ♏x.

It is occasionally used as a rubefacient, in paralysis, chronic rheumatism, and wherever excitant embrocations are indicated.

Succinic Acid, obtained in the distillation of oil of amber, possesses similar properties to the latter, and is officinal in the Dublin Pharmacopœia. It was at one time used as an excitant in rheumatism, but is now never employed.

Besides the vegetable excitants, already mentioned, the Pharmacopœia of the United States has the following in its secondary list.

36. Cata'ria, Catnep. The leaves of *Nep'eta Cata'ria, Catnep* or *Catmint;* Sex. Syst. Didynamia Gymnospermia; Nat. Ord. Labiatæ; are well known in the United States, and much used in domestic practice. They have a strong, peculiar odour, and a bitter, aromatic taste, their properties being mainly dependent upon essential oil. Catnep readily yields its virtues to water, and hence the *infusion—catnep tea*—is the form in which it is usually given.

Catnep tea is a common domestic remedy in cases of colic in infants, and some nurses are in the habit of feeding them upon it for the first day or two. It is also used in cases of amenorrhœa. It is scarcely ever prescribed by the physician.

37. Heracle'um, Masterwort. The root of *Heracle'um lana'tum,* sometimes called *Cow-parsnip;* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ, is a common umbelliferous plant, from Canada to Pennsylvania, which flowers in June. The root resembles parsley, has a strong disagreeable odour, and an acrid taste. It is excitant when applied to the skin.

Masterwort is an excitant, and has been used as such in cases of want of tone of the stomach, accompanied by flatulence. It has likewise been prescribed in epilepsy, accompanied by the same gastric condition. It may be given in powder or infusion. The author has never used it.

38. SOLIDA'GO, GOLDEN ROD. The leaves of *Solida'go odo'ra*, or *sweet scented Golden Rod;* SEX. SYST. Syngenesia superflua; NAT. ORD. Compositæ Corymbiferæ; a plant, which grows in woods and fields throughout the United States, and flowers in September, have an agreeable fragrant odour. They yield on distillation a volatile oil, which possesses the taste and aroma of the plant in a high degree, and on which its therapeutical virtues are dependent.

Golden rod has all the excitant virtues of the aromatic herbs,—being carminative, and an excitant diaphoretic when given in warm infusion; in which form it is also administered as an excitant to the gastric functions. An essence, made by dissolving the essential oil in dilute alcohol, is used in the Eastern States as a remedy in complaints arising from flatulence, and as a vehicle for disagreeable medicines of various kinds. (*Professor Bigelow*, of Boston.) The dried flowers are said to be a substitute for common tea.

39. AL'COHOL.

Alcohol, in pharmacy, means rectified spirit, of the specific gravity 0.835;—*dilute alcohol*, **ALCOHOL DILUTUM**, consisting of equal portions, by measure, of *alcohol* and *distilled water*. Its specific gravity is 0.935. These are the menstrua, which are employed in the formation of tinctures and other preparations, referred to in the course of the present work. In this place, the use of the various alcoholic liquors, as excitants, has to be treated of. These may be divided into three classes;—*Ardent Spirits*, *Wines*, and *Malt Liquors*.

a. ARDENT SPIRITS.

Ardent spirits are obtained from the distillation of vinous liquids; and the resulting spirit differs according to the precise vinous liquid that may be employed in the distillation. For example, the spirit obtained from the distillation of the fermented juice of the grape is BRANDY; that which is obtained from molasses is RUM; that from a fermented infusion of grain, CORN SPIRIT; from one of rice or toddy, ARRACK; from peach juice fermented, PEACH BRANDY; from cider fermented, APPLE BRANDY; whilst

GIN, HOLLANDS, SCOTCH and IRISH WHISKEY, are CORN SPIRIT flavoured. All these contain various proportions of alcohol, volatile oil, water; and, frequently—as in brandy and rum—colouring matter,—the volatile oil communicating to the particular spirit the aroma by which it is distinguished. These different spirits vary greatly from each other, as to the quantity of alcohol which they contain. From experiments on some of them, the following was the average quantity s. g. 0.825, obtained at 60° Fahr. (*Brande.*)

Alcohol by measure.		*Alcohol by measure.*	
100 parts by measure of		100 parts by measure of	
Brandy contain	55.39	Whiskey (Scotch)	54.32
Rum "	53.68	Whiskey (Irish	53.90
Gin "	51.60		

b. WINES.

Of the varieties of wine in regard to their dietetic uses, and the marked differences that exist between them, the author has treated at great length in another work, to which the reader is referred. (See *Elements of Hygiène*, p. 354, Philad. 1835.) It will be sufficient here to point out their relative qualities as excitants. When subjected to analysis, they afford nearly the same products. They contain much water; alcohol, in variable quantity; mucilage; tannic acid; a blue colouring matter, which becomes red, when it unites with acids; a yellow colouring matter; bitartrate of potassa; tartrate of lime; acetic acid, and, at times, other salts,—as the chloride of sodium, and the sulphate of potassa. It is to the alcohol, that they owe their strength; the more abundant it is, the more generous the wine. The mucilage communicates no particular property to them; the tannic acid gives them a kind of roughness, and the power of being clarified by a solution of glue, or of white of egg; the bitartrate of potassa, and the acetic acid give them tartness, so that they acquire value by being kept, not only because their principles undergo modification in their combination, but because tartar is deposited.

The following table was drawn up by Mr. Brande from the results of his experiments on various wines. It is proper, however, to remark, that many of them were prepared expressly for the London market, and are more brandied or "reinforced" than the same varieties sold in the United States. This is strikingly the fact with port. Dr. Henderson, too, has remarked, that some of the wines, analyzed by Mr. Brande, were mixed with a considerable quantity of adventitious alcohol. His additions and corrections have the letter H. affixed.

Proportion of Alcohol, S. G. 0.825, *in one hundred parts by measure of the following wines, and malt and spirituous liquors.*

1. Lissa,		26.47
do.		24.35
Average,	(*a*)	25.41
2. Raisin Wine,		26.40
do.		25.77
do.		23.20
Average,		25.12
3. Marsala,		26.03
do.		25.05
Average,	(*b*)	25.09
4. Port—average of six kinds,		23.48
do. —highest,		25.83
do. — lowest,		21.40
5. Madeira,		24.42
do.		23.93
do. (Sercial,)		21.45
do.		19.24
Average,		22.27
6. Currant Wine,		20.55
7. Sherry,		19.81
do.		19.83
do.		18.79
do.		18.25
Average,		19.17
8. Teneriffe,		19.79
9. Colares,		19.75
10. Lachryma Christi,		19.70
11. Constantia—white,		19.75
red,	(*c*)	18.92
12. Lisbon,		18.94
13. Malaga,		18.94
14. Bucellas,		18.49
15. Red Madeira,		22.30
do.		18.40
Average,		20.35
16. Cape Muscat,		18.25
17. Cape Madeira,		22.94
do.		20.50
do.		18.11
Average,		20.51
18. Grape Wine,		18.11
19. Calcavella,		19.20
do.		18.10
Average,		18.65
20. Vidonia,		19.25
21. Alba Flora,		17.26
22. Malaga,		17.26
23. White Hermitage,		17.43
24. Roussillon,		19.00
do.		17.26
Average,		18.13
25. Claret,		17.11
do.		16.32
do.		14.08
do.		12.91
Average,	(*d*)	15.10
26. Malmsey Madeira,		16.40
27. Lunel,		15.52
28. Scheraaz,		15.52
29. Syracuse,		15.28
30. Sauterne,		14.22
31. Burgundy,		16.60
do.		15.22
do.		14.53
do.		11.95
Average,		14.57
32. Hock,		14.37
do.		13.00
do. (old in cask,)		8.88
Average,		12.08
Rudesheimer, (1811)	H.	10.72
do. (1800)	H.	12.22
Average,	H.	11.47
Johannisberger,	H.	8.71
33. Nice,		14.63
34. Barsac,		13.86
35. Tent,		13.30
36. Champagne, (still,)		13.80
do. (sparkling,)		12.80
do. (red,)		12.56
do.		11.30
Average,		12.61
37. Red Hermitage,		12.32
38. Vin de Grave,		13.94
do.		12.80
Average,		13.37
39. Frontignac,		12.79
40. Cote Rotie,		12.32
41. Gooseberry Wine,		11.84
42. Orange Wine—average of six samples made by a London manufacturer,		11.26
43. Tokay,		9.88
44. Elder Wine,		9.87
45. Rhenish Wine,	H.	8.71
46. Cider—highest average,		9.87
lowest,		5.[illegible]
47. Perry—average of 4 samples,		7[illegible]6
48. Mead,		7.32
49. Ale, (Burton,)		8.88
do. (Edinburgh,		6.20
do. (Dorchester,)		5.56
Average,		6.87
50. Brown Stout,		6.80
51. London Porter, (average,)		4.20
do. Small Beer, (average,)		1.28
52. Brandy,		53.39
53. Rum,		53.68
54. Gin,		51.60
55. Scotch Whiskey,		54.32
56. Irish do.		53.90

(*a*) 15.90 H. (*b*) 18.40 H. (*c*) 14.50 H. (*d*) 12.91 H.

All wines are necessarily excitant by reason of the alcohol which they contain, but some are more so than others. There are but few, however, which are employed therapeutically, as excitants. These are chiefly SHERRY, MADEIRA and PORT; the first being the only one that is officinal—the VINUM of the Pharmacopœia of the United States—on account of its greater uniformity; and, therefore, better adaptation for pharmaceutical purposes: it is the VINUM ALBUM HISPANICUM of the British pharmacopœias; is almost wholly free from acidity, and consequently well adapted for the dyspeptic and gouty. Madeira wines are more acid; and those of Oporto or Port abound in astringency; they are, therefore, preferred in diseases, in which an astringent and excitant agency is needed. They are very apt to disagree with the dyspeptic, owing, perhaps, to the gallic acid which they contain. The brisk WINES OF CHAMPAGNE; the heady WINES OF BURGUNDY; the light WINES OF BORDEAUX, and of the RHINE and MOSELLE, are not often given with us as excitants; yet Dr. Henderson affirms, that in certain species of fever, accompanied by a low pulse, and great nervous exhaustion, they have been found to possess considerable efficacy, and may be given with more safety than most other kinds.

C. MALT LIQUORS.

Malt liquors differ from wines chiefly in the following points. They contain a much greater proportion of nutritive matter, and less alcohol; but they have, in addition, a peculiar bitter and perhaps narcotic principle, derived from the hop. Without the hop, the ale would not keep, especially that intended for the warmer climates; and hence the PALE ALE, intended for the India market, is always made intensely bitter with the hop. Independently of the flavour and tonic properties, which hops communicate, they precipitate by means of their astringent principle, the vegetable mucilage, and thus remove from the beer the active principle of its fermentation; consequently, without hops, malt liquors would have to be drunk either new and ropy, or old and sour. (*Paris.*)

Malt liquors are unquestionably nutritive, where they agree; and in the system of 'training' for athletic exercises, which consists in raising the powers of the individual to the full extent of which he is capable, about three pints a day of mild home-brewed ale are recommended for drink. Malt liquors do not digest well, however, with those of weak powers. The extractive is apt to produce flatulence and heartburn.

In regard to alcohol, it is rarely administered internally as an excitant. When it is indicated, some form of ardent spirit is usually chosen; and of these, brandy is most commonly selected.

Frequently, however, in remote country situations, it is not to be met with. In such case, whiskey, or peach or apple brandy is employed. In small quantities, it is taken in certain forms of dyspepsia, especially where articles difficult of digestion have been eaten, and gastrodynia results. Occasionally, too, it checks sickness of the stomach, especially sea-sickness; although no permanent good effect can be expected in the last, until the individual becomes accustomed to the motion of the vessel. In the latter stages of fever, and in adynamic conditions of all kinds, it is much employed; but in fever it is less adapted than wine,—the stimulus of the latter being more permanent and manageable. It may be given in such cases in the form of *toddy*, or spirit and water sweetened, or in that of *milk punch*, where the stomach will bear it; but care must be taken not to hurry too much the organic actions. In old drinkers, a small allowance—two to four ounces in the twenty-four hours —is sometimes advisable in the course of ataxic and adynamic diseases, but the quantity should be gradually diminished, until it is abandoned. It need scarcely be said, that the case must be bad indeed, in which the hopes of the practitioner are placed on the excitement, which alcohol is capable of inducing. It may be a question, indeed, whether it be not calculated to exhaust the slight amount of excitability still existing in the system. Perhaps, in delirium tremens, it is most largely depended upon by some practitioners; yet,—as elsewhere remarked,—the disease is certainly, in the generality of cases, best treated eclectically. The recuperative powers of the system are usually sufficient to restore the individual. Some, however, give ardent spirit freely—an ounce or two every hour—and, doubtless, under the stimulation, the individual may be restored to the condition in which he was prior to the withdrawal of the stimulus which gave rise to the disease. (See the author's *Practice of Medicine*, ii. 344, Philada. 1842.)

Externally, alcohol is much employed as an excitant to inflamed parts, where the hyperæmia affects the skin more especially,—as in erysipelas, burns and scalds when the epidermis is not removed, and in sprains and bruises. Not only does it act as an excitant in such cases, when first applied, but during its evaporation it causes an agreeable sense of coolness in the affected parts. Largely diluted with water, it forms an excellent collyrium in chronic conjunctivitis.

Owing to its excitant properties, when applied to vessels that are the seat of hemorrhage, it coagulates the albumen, at the same time constringing the vessels, and thus acts as a styptic; and it is occasionally used as an excitant injection for the radical cure of hydrocele. Rubbing the limbs or body with spirit—as with whiskey, is not unfrequently had recourse to, in order to arouse the powers of the system generally or those of some internal organ.

In regard to the therapeutical use of wine, it is decidedly the best stimulant in long protracted fevers. It is much more permanent in its action than ardent spirit, and its strength can be regulated, so that, under careful watching, no bad effects can easily result from its use. The phenomena, that render it admissible in fevers, are—signs of great prostration; and those that show that it is proper for the patient, are, its being relished by him; agreeing with the stomach, not increasing the heat of the skin, or dryness of the tongue; and the general feelings and condition becoming ameliorated.

Any of the three stronger wines—Sherry, Madeira or Port—may be prescribed; but unless there be a morbid complication, which requires the astringency of the last, Sherry is to be preferred. It may be given mixed with an equal quantity of water, and sweetened, if the patient prefers it, or in the form of *wine whey*. Four ounces, in the course of the twenty-four hours, may be prescribed, should doubt exist as to the propriety of its administration; and if it agrees, the quantity may be gradually increased. In highly adynamic states, as in malignant typhus, a bottle or two may be given in the day with manifest advantage. Should it appear to disagree, it may be discontinued gradually. Great caution is, however, needed in the exhibition of this, as well as of other excitants, in fever; and upon the whole we may say of it—with a modern writer (*A. T. Thomson*)—as of every other potent article, that "it is a medicine or a poison, according to the discretion and moderation with which it is used, and the skill and judgment which direct its medicinal employment."

Malt liquors are not much employed therapeutically as excitants; but bottled porter is occasionally given in adynamic conditions, which fall under the care of the surgeon more especially, as in local gangrene, sloughing ulcers, &c. Occasionally, this liquor agrees with the dyspeptic,—apparently owing to the carbonic acid, which it gives off,—when the still malt liquors could not be taken with impunity.

40. ÆTHER SULPHU'RICUS.—SULPHURIC ETHER.

Ethers are formed by the action of various acids on alcohol; and they differ in their sensible, but not materially in their medical properties, according to the acid employed. Hence, but two are contained in the Pharmacopœia of the United States—the *Sulphuric* and the *Nitric*.

Sulphuric ether is formed by the action of sulphuric acid on alcohol; but when prepared in this manner, the distilled liquor contains alcohol, water, sulphurous acid, and oil of wine. To rectify it, potassa, or carbonate of potassa was directed to be added to it, and that it should be redistilled. The product was the ÆTHER SULPHU'RICUS RECTIFICA'TUS, of the former edition of the Pharmacopœia of the United States, and of the British Colleges. In the last edition, however, of the Pharmacopœia of the United States, the addition of the potassa is a part of the process, so that the **ÆTHER SULPHURICUS** of that edition corresponds with the *Æther Sulphuricus Rectificatus* of former editions. In this state it wholly evaporates in the air, and, when agitated with an equal bulk of water, loses about one tenth of its volume.

The theory of etherification is very complex, and has occupied the attention of many chemists of distinction. Alcohol in its pure state, is generally regarded as a compound of ether and water; consequently, if the water be separated by any agency as by that of sulphuric acid, the ether will remain; but for the mode in which this, and the various accessory reactions are effected, the reader is referred to the works of Liebig, Turner, Pereira, and others.

Sulphuric ether is a colourless, transparent fluid, of a peculiar penetrating and fragrant odour, and a hot pungent taste, followed by a sense of coolness. The specific gravity of that of the United States Pharmacopœia is 0.750; hence it is extremely volatile. It boils at about the temperature of 96°. When pure and recently prepared, it is neither acid nor alkaline, but by exposure to air and light it absorbs oxygen, by which acetic acid and water are formed. It is sparingly soluble in water,—ten volumes, as already remarked, dissolving one of it. By alcohol it is dissolved in all proportions. It dissolves the volatile oils, and most of the fatty and resinous substances.

The action of ether on the economy is more diffusibly excitant than that of any other article, and, accordingly, its operation is very transient. Hence, it is better adapted than alcohol, where the object is to stimulate the stomach, without, at the same time, augmenting the action of the heart and arteries. Accordingly, it is given with great advantage in severe gastrodynia and flatulence. In large doses, it produces intoxication like alcohol, and, in still larger, narcosis. It appears to pass readily into the circulation, and is copiously exhaled with the pulmonary transpiration. Like alcohol, it has been detected in the brains of those who have died after it has been exhibited in large quantity.

The author has treated elsewhere of the use of sulphuric ether in spasmodic diseases, for which it is better adapted, than for diseases of debility; although it is often given in the latter, when the powers of life are flagging; and, too often, where but little expectation of benefit can be expected from the use of any remedies.

The dose is f. ʒss. to f. ʒij, incorporated with water by rubbing it with spermaceti, in the proportion of two grains to each fluidrachm of ether.

The **SPIRITUS ÆTHERIS SULPHURICI COMPOSITUS**, or **COMPOUND SPIRIT OF ETHER**, (p. 383,) and the **SPIRITUS ÆTHERIS NITRICI**, or **SPIRIT OF NITRIC ETHER**, (p. 277,) may be used in the same cases as the sulphuric ether. By reason, however, of their containing more alcohol, they are less diffusible in their action, and, therefore, better adapted for cases in which a more permanent stimulus is needed. Their dose is f. ʒss. to f. ʒiij, repeated as the case may seem to require.

41. CREASOTUM.—CREASOTE.

Creasote, in the Pharmacopœia of the United States, is defined to be "a peculiar substance, obtained from tar." It is produced artificially during the destructive distillation of organic substances, and is found in pyroligneous acid, Dippel's oil, wood smoke, &c. Its most abundant source is the tar or pyroligneous acid obtained from the wood of the birch. In the neighbourhood of Edinburgh it is procured in large quantity, and of fine quality, from Archangel Tar. (*Christison.*) It is not prepared by the apothecary, and, therefore, is not amongst the preparations in the Pharmacopœia of the United States, (1842,) but in the list of the Materia Medica. All the processes for obtaining it are complex; many of them are given by the author in another work. (*New Remedies*, 3d edit. p. 166, Philad. 1841.)

Creasote is a colourless, transparent, and oleaginous liquid, of an odour which is highly characteristic. It is entirely soluble in acetic acid, alcohol, and caustic potassa; and coagulates the albumen of eggs, of the blood, and of albuminous fluids. When dropped on paper, and exposed to heat, it is entirely volatilized, and does not leave a greasy stain. It is powerfully antiseptic, whence its name, from κρεας, "flesh," and σωτως, "preserver." Its specific gravity is generally stated at 1037, as given by Reichenbach, who discovered it some years ago; but Dr. Christison states, that he has never found it lower than 1065, or higher than 1067. Water dissolves $\frac{1}{400}$th part of it, and acquires a peculiar acrid taste, and a powerful smoky smell, which is perceptible when the creasote only forms $\frac{1}{10,000}$th part of it.

Creasote, when applied locally, is an unquestioned irritant. When put upon the tongue, it causes an excessive burning sensation; and applied to a part whence the epidermis has been removed, or to a wound,—instantaneously, an extremely violent burning pain is experienced, which continues for eight or ten minutes, but, if the part be carefully washed, it gradually ceases. The surface also becomes white, as if nitrate of silver had been applied to it, owing to the action of the creasote on the organic matters. Given internally in large doses, it occasions considerable irritation in the gastro-enteric mucous membrane; and, when it destroys, death is preceded by more or less narcosis; hence it has been ranked as an acro-narcotic poison. (*Christison.*) In three experiments, which were made with it on dogs by Dr. Cormack, of Edinburgh, twenty-five drops of pure creasote were injected into the veins. All the animals died; and in every case, the following phenomena were observed. Its first deleterious action was a powerful one of sedation on the heart; the vital energies of that viscus seeming to be instantaneously paralyzed. In some instances, hurried and sonorous respiration went on for more than a minute after the heart had ceased to beat. In general, one or two convulsions, resembling the tetanic, preceded death. In every instance, the atony of the heart immediately after death was very striking.

In the case of a patient of the author, who took ten drops of it by mistake, great vertigo, headache and a sensation as if the head were about to burst by expansion, supervened, with vomiting, and much gastric distress. When taken for a length of time, it appears to communicate a blackish hue to the urine, and, in some cases, can be detected in that fluid.

Creasote is used as an internal excitant in cases of gastrodynia and flatulence of the stomach and bowels; but it does not seem to possess any advantage over the essential oils and other diffusible excitants, whilst it has the objection of being exceedingly disagreeable. It has been tried—it is not easy to see on what principle—in diabetes mellitus; but the encouragement is not great to repose any confidence in it. Nor has its efficacy been more marked in gouty and rheumatic cases, in which it has been prescribed by some. Of its value in internal hemorrhages, mention has been made under the proper head. (See ASTRINGENTS.)

Externally, it has been used in various cases as a topical excitant,—for example, in the form of wash or ointment, in burns, in chafing of the integuments—*intertrigo;* in sore nipples; chilblains; in fissures of the skin; and ulcers, especially of the sluggish, atonic kind; and, indeed, in every form in which it seems advisable to change the action of the parts by an appropriate excitant,—or where, from the offensive nature of the discharge an antiseptic or disinfectant is needed; in cancerous affections of the uterus and other parts; in lupus, and various other chronic cutaneous affections; ophthalmia tarsi; prolapsus vaginæ, &c. It has, likewise, been applied in cases of toothache, by means of a camel's hair pencil passed into the hollow of the tooth, or of cotton dipped in a mixture of equal portions of creasote and alcohol. In deafness, connected with a deficiency of ceruminous secretion it has been used with advantage, in the proportion of one part of *creasote* to six or eight parts of *olive oil* or *lard*. It may be introduced into the meatus by means of a camel's hair pencil. As a caustic, it may be applied undiluted.

Besides its excitant properties, it possesses others, which have been described in the proper places. (See, also, the author's *New Remedies*, 3d edit. p. 165, Philad. 1841.)

Creasote is sometimes given in the form of pill, which greatly masks its disagreeable characters. (*Creasot.* ♏x; Pulv. *Glycyrrhiz.* ʒj; *Mucilag. acaciæ*, q. s. ut fiant pilulæ xx. Two for a dose.) Or, one or two drops may be diffused by means of mucilage in some aromatic water.

The strength of lotions may vary from ♏ij. to ♏vj. to the ounce of water. The ordinary strength of *Creasote water* is, however, one part of creasote to eighty of water. It may, also, be added to poultices in cases of foul or gangrenous ulcers.

UNGUEN'TUM CREASO'TI, OINTMENT OF CREASOTE. (*Creasot.* ʒss; *Adipis*, ℥j.) This ointment is of a good strength for ordinary cases of cutaneous disease. The author has succeeded in removing lupus, and porrigo of the scalp by means of it, after other topical agents had failed.

42. AMMO'NIA.

The different preparations of ammonia are excellent excitants, and well adapted for the relief of certain morbid conditions.

Ammoniacal gas is obtained for medicinal purposes by the decomposition of the *Muriate of ammonia*, by means of *lime*, which has a stronger affinity for the chlorohydric acid than the ammonia, and consequently displaces it. The ammonia is given off in the gaseous state. It is too excitant, however, under almost any form of management to be employed therapeutically; and as it is very soluble in water, it is allowed to combine with that fluid and form the officinal

1. LIQUOR AMMO'NIÆ, SOLUTION OF AMMONIA, or WATER OF AMMONIA. The specific gravity of this preparation—as directed in the Pharmacopœia of the United States, (1842)—is 0.96; and 100 grains of it saturate 30 grains of officinal sulphuric acid. It is a transparent colourless liquid, of a highly pungent odour, and caustic alkaline taste; sometimes, it contains carbonate of ammonia, which may be detected by lime water, which occasions a milky precipitate of carbonate of lime, if carbonic acid be present, and it effervesces with dilute acids. When exposed to the air, it quickly parts with ammonia, and also absorbs carbonic acid. so that it must be kept in well stopped bottles. It unites with oil, so as to form soaps or liniments.

Liquor ammoniæ of the United States' Pharmacopœia is not often prescribed internally in its uncombined state. When properly diluted, however, it may be given in cases of heartburn, accompanied by atony of the digestive organs; its alkaline properties neutralizing the acid already in the stomach, whilst its excitant agency tends to prevent the generation of more. The carbonate of ammonia is, however, usually preferred.

Liquor ammoniæ is held to the nose in cases of fainting, that its vapour may impress the olfactory nerves; and its excitant effects are often, in this way, beneficial. It is said, that an attack of epilepsy has been prevented in the same manner. It has been occasionally used in cases of asphyxia, as from drowning; the epiglottis being touched with the finger, or a feather dipped in a little of it, and it is said with success. Care, however, must be taken, lest the spark be extinguished by it. It is most commonly employed to induce rubefaction in a variety of affections, especially in those of a rheumatic or neuralgic nature. It has been suggested as an excitant in amenorrhœa, and in chronic leucorrhœa,—a few drops being added to milk; but it need scarcely be said, that so powerful an excitant should be used with caution. The various preparations of ammonia have been extolled, too, in the bites of poisonous serpents and insects, and they certainly are often of decided advantage.

The dose of liquor ammoniæ is from gtt. v. to gtt. xx. or xxx., properly diluted with milk.

2. **LIQUOR AMMO'NIÆ FOR'TIOR, STRONG SOLUTION OF AMMONIA.** An aqueous solution of ammonia of the specific gravity 0.882, is directed in the Pharmacopœia of the United States: as, however, it is prepared by the druggist, it is not placed amongst the preparations, but in the Materia Medica list. This stronger solution of ammonia may be employed to make the *Liquor ammoniæ*—the preparation last described—by mixing one part by measure of the stronger solution with two parts of distilled water.

Strong solution of ammonia has been introduced into the pharmacopœias mainly on account of its counter-irritant properties, to excite rubefaction and vesication of the cutaneous surface. When two parts of *Liquor ammoniæ* are united with one part of *suet*, and one part of *oil of sweet almonds*, the mixture forms the *Pommade ammoniacale of Gondret*, which has been used for a long time to excite a speedy revulsion in chronic affections of the brain, incipient cataract, amaurosis, &c., as well as to cauterize the integuments deeply.

It also forms the basis of the counter-irritant or "*antidynous lotions*" *of Granville*, which were brought forward a few years ago with high pretensions by Dr. Granville, of London, and in a manner not calculated to enhance his professional reputation. The stronger, and the milder lotion were composed as follows:—

Stronger ammoniated lotion.—℞. Liq. ammon. fort. ʒx; spirit. rosmarin. ℥ss; camphor. ʒij.—M.

Milder ammoniated lotion.—℞. Liquor. ammon. fort. ℥j; spirit. rosmarin. ʒvj; tinct. camphor. ʒij.—M.

The stronger of these lotions is a powerful agent. They are both employed as cutaneous revellents, and their special application will be considered elsewhere. (See Revellents.)

3. **SPIR′ITUS AMMO′NIÆ, SPIRIT OF AMMONIA.** This preparation is made in the same manner as liquor ammoniæ, by decomposing *muriate of ammonia* by means of *lime*, and causing the ammoniacal gas to pass into *alcohol* in place of water. It is, therefore, ammonia dissolved in alcohol, and possesses the properties of the ammoniacal preparations in general. It is chiefly, however, used in the preparation of the ammoniated tinctures, but may be given as an excitant in the dose of 20 to 60 drops, in a wine-glassful of water.

4. **SPIR′ITUS AMMO′NIÆ AROMAT′ICUS, AROMATIC SPIRIT OF AMMONIA,** (p. 406.) The spirit of carbonate of ammonia, in this preparation, is rendered more agreeable by the addition of the aromatics, and is much used in faintness and flatulence; in the former case, both as an excitant held to the nose; and in both cases administered internally. The dose is the same as that of the *spiritus ammoniæ*.

5. **AMMO′NIÆ CARBONAS, CARBONATE OF AMMONIA,** called also *Sal volat′ilē* and *Hartshorn salt*, is prepared by subliming a mixture of *muriate of ammonia* and *chalk*, (carbonate of lime.) The muriatic acid lays hold of the lime, and the carbonate of ammonia sublimes.

Carbonate or sesquicarbonate (*London College*) of ammonia is in whitish translucent fibrous masses, of a powerful ammoniacal odour, and a pungent alkaline and ammoniacal taste. It is wholly soluble in water, and entirely dissipated by heat. When exposed to the air, it falls into powder, becomes opaque, and loses ammonia. It forms soaps with oils, and is freely soluble in dilute alcohol, but very slightly so in alcohol.

Carbonate of ammonia possesses all the excitant properties of the ammoniacal preparations, tempered by the combination with carbonic acid. It is, therefore, more frequently given as an excitant, where the object is to support the powers, than any of the others. In long protracted fevers, particularly of the typhous class, it is frequently prescribed alone, or along with other excitants, as wine whey. It is also given in heartburn, dependent upon an asthenic condition of the digestive organs. Under the name *smelling salts*, it is in constant domestic use in fainting. Usually, in such cases, an aromatic oil, as oil of bergamot or of lavender, is added; and, at times, its strength is increased by the addition of a little of the stronger solution of ammonia.

The dose, as an excitant, is from five to ten grains every few hours, in the form of pill, or mixed with a little syrup, which masks its taste.

It is sometimes used, mixed with oil or lard, or dissolved in water, as a topical excitant and revellent, in rheumatic pains, &c., but the liquid preparations of ammonia are employed more readily, and quite as satisfactorily.

Carbonate of ammonia enters into the formation of the *Cuprum ammoniatum*, and the *Liquor ammoniæ acetatis* of the Pharmacopœia of the United States.

6. **AMMONIÆ MURIAS, MURIATE OF AMMONIA.** *Muriate of ammonia*, *Hydrochlorate* or *Chlorohydrate of ammonia*, or *Sal ammoniac*, is a natural production, being found in and near volcanoes, and occasionally the salt of commerce has been obtained from this source. It is now, however, principally prepared by decomposing *sulphate of ammonia* by means of *chloride of sodium* or common salt; and at the present time, in England, is manufactured from the impure ammoniacal liquors, obtained as secondary products. The various modes for preparing it are well given by a recent writer on pharmacology. (*Pereira.*)

In this country, it is obtained from abroad in two commercial varieties—the *crude* and the *refined;* the former of which is imported from Calcutta and is used in the arts; the latter is derived from England.

As met with in the shops, muriate of ammonia is white and translucent, occurring generally in concavo-convex pieces, which have the shape of the vessel into which the salt is sublimed. It is wholly volatilized by heat, and dissolved by water. Its taste is saline and acrid, but it is devoid of smell. It is soluble in about three parts of cold, and one of boiling water, and cold is produced during the solution. It dissolves, also, in alcohol. Its specific gravity is 1.450.

Muriate of ammonia is scarcely ever employed in this country as an internal agent; but in Germany, it is used in the most opposite cases; some esteeming it to be excitant; others refrigerant and sedative. It is unquestionably excitant, both when employed internally and externally. As a lotion, it is sometimes used in cases of encephalic affections, owing to the cold it induces. With such view, it ought, of course, to be applied at the moment of solution. It need scarcely be said, however, that we have in iced water a far more available and effective application. As an excitant, it is employed in cases of sprains and contusions; in indolent tumours, inflammation of the eyes, chilblains; in chronic cutaneous affections, as scabies; and as an injection in gonorrhœa, leucorrhœa, &c. An ounce or two of the salt may be dissolved in a pint of water, to which an ounce or two of alcohol may be added, where it is desired to apply it as discutient. Solutions of the strength of ʒj. to ℥ss. of the salt to Oj. of water, may be used as washes in cutaneous affections, or as injections in the diseases above mentioned.

43. PHOS'PHORUS.

Phosphorus is made by adding *sulphuric acid* to *bone ashes*, which consist principally of phosphate of lime. In this way sulphate and superphosphate of lime are formed. Water is added to this, and after standing for some time, the solution is filtered. It is then evaporated until it has the consistence of syrup, when it is mixed with charcoal, dried, and distilled in an earthen retort. By this process, the charcoal abstracts oxygen from the phosphoric acid of the superphosphate; the phosphorus is consequently set free, volatilized and condensed in water, in a proper receiver. It may be purified by pressing it through chamois leather under water. It is afterwards moulded into cylinders.

Phosphorus, when pure, is devoid of colour, but has usually a reddish hue. It has no taste, but has an alliaceous odour; is flexible at ordinary temperatures; and of a specific gravity 1.77. It is insoluble in water, but soluble in ether, and in the fixed and volatile oils.

Phosphorus is, in small doses, a powerful diffusible excitant; and in large doses, an acrid poison. It has been esteemed adapted for cases of great prostration of the powers, no matter what may be the accompanying disease. It is very rarely used, however, in this country. It is affirmed, from the personal experience of A. Leroy, Chenevix, Bouttatz and others, to be aphrodisiac, and has therefore been used in the impotence of old and debilitated subjects.

Phosphorus is shown to be an essential constituent of the neurine, (*Liebig*,) and we shall not be surprised to see it prescribed in nervous diseases particularly, on the hypothesis, that want of nervous power may depend upon a deficiency in the due proportion of that element!

Phosphorus is generally administered dissolved in ether or oil. The TINCTURA ÆTHEREA CUM PHOSPHORO of the French Codex consists of *Phosphorus* 4 parts, *Sulphuric Ether* 200 parts, by weight. Each ounce contains about four grains of phosphorus; and the dose is from five to ten drops. It has been suggested as an objection to this preparation, that the ether might evaporate, and the phosphorus ignite in the stomach.

The Prussian Pharmacopœia has an OLEUM PHOSPHORATUM, which consists of twelve grains of *phosphorus* dissolved in an ounce of *almond oil*. The solution is of the same strength as the ethereal solution, and, consequently, may be prescribed in the same doses. Both the preparations may be given in some mucilaginous liquid, to which any aromatic water or oil may be added.

It need hardly be said, that the greatest caution should be used in the administration of this powerful agent; nor does it appear to possess any properties that might not be as well supplied by agents that are more manageable.

44. CALORIC.

Under Diaphoretics the effect of Caloric of a lower temperature than that of the human body was considered. We have here to regard it at a higher temperature, and one in which it is excitant.

a. HOT AIR BATH.

When air is heated to 98°—the temperature of the body—and upwards as far as 130°, it acts as a powerful excitant to the organic actions; and hence is adapted for congestive cases, in which the blood has accumulated in the internal organs, and has left the surface of the body. Accordingly, in certain cases of congestive intermittents and remittents, it may be advisable. It has, likewise, been used in the algid period of cholera. Dr. Pereira affirms, that it is highly useful in asphyxia from drowning and from some other causes; yet the best opinion would seem to be, that exposure of one labouring under asphyxia to very elevated temperature can scarcely fail to be injurious. (See the article Asphyxia, by the author, in the *American Cyclopedia of Medicine and Surgery*, vol. 2, Philad. 1836, and his *Practice of Medicine*, i. 421, Philad. 1842.)

The excitant and revellent action of the hot air bath is likewise exhibited in cases of chronic rheumatic and neuralgic affections. Sometimes, it is rendered more excitant by being impregnated with essential oils, or with sulphurous acid gas or chlorine; and has proved beneficial in certain chronic cutaneous diseases.

b. HOT VAPOUR BATH.

The vapour bath, at a temperature of from 120° to 140°, is an excitant to all the organic actions, and is, therefore, adapted to the same class of cases as the hot air bath. In addition, however, it relaxes the skin, and is accompanied by profuse sweating. Hence, it can be employed with great advantage in long protracted diseases of the rheumatic or neuralgic kind; and in debilitated individuals, in whom it is desirable to produce an excitation of the cutaneous system, and thus detract from mischief that may be existing internally. It has been successfully employed in rheumatic and other affections, which have completely crippled the sufferers; and by some cures of this nature that have been effected, it has attracted attention to a class of ignorant empirics, who employ it largely, combined or not with other excitants. The regular practitioner has too much neglected this potent agent; no hospital, indeed, should be without an apparatus for the purpose. It is certainly more efficacious in some affections than the ordinary aqueous baths are in any.

In Russia, the vapour bath is used as a luxury, and the author has elsewhere referred to the impunity with which the bather leaves a temperature of 137° to pass into one not above 32°. This form of bath is becoming introduced into other countries.

The vapour of hot water is, sometimes, applied topically, in affections of the joints, for example; and a *douche* or stream of hot vapour is sometimes made to impinge on a part affected with neuralgia with advantage. Occasionally, too, aromatics are volatilized, and mixed with the watery vapour, as well as sulphurous acid gas and chlorine.

c. HOT WATER BATH.

The hot water bath is one in which the temperature of the water exceeds 98° of Fahrenheit's scale. It differs essentially in its effects upon the system from the warm bath: whilst the latter is soothing, and disposing to mental and corporeal quietude, the former is excitant, stimulating the nervous and vascular systems to a degree, which, in particular predispositions and habits, and during the existence of certain diseases—those of nervous and vascular erethism, for example—is positively injurious. This is readily understood, when we reflect upon the effects occasioned by immersing the healthy body in a bath of this kind. The bulk of the extremities is increased, so that rings become too small for the fingers; the fluids expand; and hence the supervention of the most manifest signs of polyæmia. The pulse becomes quick; the respiration accelerated and embarrassed; the carotid and temporal arteries beat violently; a feeling of anxiety is experienced in the præcordial region; and these phenomena are, at times, accompanied or followed by palpitations, fainting, vertigo, and, occasionally, by apoplexy. All these effects are more marked, the hotter the bath; the longer the person remains in it, and the greater the degree of plethora. It ought, consequently, to be employed with caution, where there is a predisposition to apoplexy, or any other form of hemorrhage, or to violent internal inflammation.

The hot water bath is not much used therapeutically, but is adapted for the same cases as the hot vapour bath, and particularly for rheumatic and neuralgic affections. Astonishing cures have been effected in such cases by immersion in the hot springs of Virginia, the highest temperature of which is 107°; and which have the advantage, possessed by no artificial bath, that the water is always maintained at the same heat, no matter how prolonged the immersion may be.

Caloric is employed topically as an excitant. Hot bricks, bottles filled with hot water, &c. are applied to the feet to excite irritation in diseases that are attended by cold extremities; as in the cold stage of intermittent, &c. The same agents, or hot flannels, or hot salt, or hot sand, are used in cases of abdominal pain, in which their action is also revellent.

45. ELECTRICITY.

Electricity, in all its forms, is excitant, and has been employed extensively, at various times, in the treatment of disease. The apparatus necessary for the medical electrician is sufficiently simple. It consists of a *cylindrical* or *plate machine*—one or two *Leyden jars*—an *electrometer* to regulate the strength of the shock from the jars—a *discharging rod*, that allows a ball to be unscrewed, leaving a point in its place; and an *insulated stool*. These are always attainable; they form part, indeed, of the ordinary electrical apparatus for experiments, as well as for the therapeutical application of electricity.

When it is desirable to subject the patient to the influence of the *electric bath*, he is placed on the insulated stool, and lays hold of a chain communicating with the prime conductor of the electrical machine, so that when the machine is in action, he forms really a part of the conductor. Positive electricity is, consequently, discharged by him at all points, and if an uninsulated metallic knob be brought near him, a spark is communicated to it in the same manner as if it approached the prime conductor. The effect of this electric condition is excitant; but no very marked influence is exerted on the functions, in the generality of cases. Dr. A. T. Thomson, however, states, that a clergyman in whom he never could produce perspiration by any of the ordinary diaphoretics, and who never perspired by exercise, or the heat of summer, when insulated and electrified perspired freely.

If when the patient is placed upon the insulated stool, and the machine is in action, an uninsulated metallic point be held near any part of his person, the *electric aura* may be drawn from him. Or if an insulated metallic director, or wire connected with the prime conductor, be held near the part to be electrified, the *electric aura*, or a current of electrified air will pass from the point to him. A sensation, resembling that produced by a stream of air, is felt on the part, and it acts as a gentle excitant to delicate structures, as the eye or ear, and to excoriated or ulcerated surfaces.

If we are desirous of employing a greater amount of excitant influence, recourse is had to the *electric spark;* which is applied either by placing the individual on an insulated stool, and bringing the knuckle, or the ball of an uninsulated director, near him; or by presenting to the part to be electrified the knob of an insulated director, connected with the prime conductor. In the former case, the spark is drawn from the patient; in the latter it is conveyed to him; yet the therapeutical effect is alike in both cases. The sparks will be more or less powerful according to the distance at which the knob is held; and, in all cases, if they be of any size, a pungent sensation is experienced; and if a succession of sparks be drawn, the part may be made red, and a small spot or wheal be induced, which soon, however, disappears. Where it is desired to electrify deep-seated parts—as the uterus through the vagina, or the meatus auditorius internus,—the conducting wire terminating in a small knob, is made to pass through a glass tube.

The sparks may be greatly diminished in size, if the part be covered with flannel; and this is a favourite mode of applying electricity with some. (*Pĕreira.*) The patient being on the insulated stool, the knob of an uninsulated director may be placed in close contact with the flannel, moving it steadily and rapidly, so as to draw a multitude of small sparks. This plan has been termed by some *electric friction.*

But the most violent effect is produced by the *shock.* In this case, the part of the body, to be electrified, is made to form a portion of the circuit, through which the electric discharge has to pass from one side of a Leyden jar to the other. The jar is charged from the prime conductor; and around its exterior and communicating with the tinfoil surrounding it, a chain is placed, which is again connected with the ball of an insulated director.

This ball, thus communicating with the exterior of the jar, is brought in contact with one side of the part to be electrified, whilst the knob of the jar, which communicates with the inner coating is brought in contact with the opposite side. The discharge then takes place instantaneously, with a shock, and by means of the "medical electrometer"—as it is termed—the strength of the charge can be graduated. The effects, produced by the shock, vary greatly according to the intensity of the charge. They may merely consist in a slightly disagreeable sensation; or may be extremely painful; and, when very intense, may destroy life. This method of electrifying, consequently, requires more circumspection than the others; and may not be at all adapted for those who are very impressible.

The *electric current*, as it is termed, consists in connecting a part of the patient's body with the prime conductor in action, so that the electricity shall pass through the body to the ground. This is, however, so feeble an agency as to be scarcely worthy of the attention of the therapeutist.

Electricity is employed as an excitant in a variety of affections. In paralysis, it has been most extensively used, and especially in cases of the partial form. Where the mischief is encephalic, it need scarcely be said, that much good cannot be expected from it; yet favourable testimony has been adduced even in these cases. (*Golding Bird.*) In nervous deafness, sparks have been given to, or taken from, the mastoid process, and around the meatus auditorius externus, and the bottom of the meatus. The same agency, as well as the electric aura, has been employed in amaurosis, but it too often fails. It has also been largely used in chronic rheumatism, and in the stiffness and rigidity that follow sprains or bruises. Of its use as an emmenagogue, mention is made elsewhere, (p. 421.) It has likewise been prescribed in the form of *electric friction* or of *slight shocks*, to promote the biliary secretion, and to modify the function of nutrition, so as to discuss indolent tumours; and recent observers have afforded testimony as to its advantages in chorea and other neuroses, in the form of electrification or of slight shocks along the spine. At one time, it was much more largely used than at present; and, although a stimulus has been afforded to its re-employment by the testimony of recent observers, (*Addison, G. Bird,*) the cases in which it can be productive of much benefit are probably very limited.

46. GALVANISM.

The therapeutical effects of galvanic or voltaic electricity are like those of ordinary electricity; and it has been used in the same cases—in paralysis, general and local; in amaurosis; deafness and dumbness of recent duration, rheumatism, &c.

The apparatus, usually employed, consists of—1. Two Cruickshank's batteries, each containing fifty pairs of copper and zinc plates, three inches square; 2. of copper-wire communicating with each end of the battery; and 3. of two insulated directors, consisting of a glass tube, through which the wire from each end of the battery passes; the free extremity, which has to be brought in contact with the part to be galvanized, being covered with sponge or flannel, moistened with a solution of common salt. When the battery is to be put in action, it may be charged with a solution of common salt, or with a weak acid liquor, consisting of not more than $\frac{1}{300}$th part of muriatic acid; and where the skin is very sensible, water alone may be used. (*Pereira.*) The wire or electrode communicating with one pole of the battery is then applied to the part to be galvanized; and the other electrode at a distance from it so as to include the affected part in the circuit. The circuit may be rapidly broken and completed, as the operator considers proper.

A different mode of application has been introduced; to which the name *Mansford's Plates* has been occasionally given, after its proposer. It consists essentially in removing the cuticle from two parts of the cutaneous surface; applying a plate of silver to one excoriated surface, and a plate of zinc to the other, and connecting the two by means of a copper wire. The exact steps of the process the author has given elsewhere. (*New Remedies*, 3d edit. p. 512; Philad. 1841.)

Under the idea, that the galvanic and nervous fluids are identical, Dr. W. Philip employed galvanism successfully in asthma; transmitting the influence from the nape of the neck to the pit of the stomach, with a power varying from ten to twenty-five pairs of plates. In these cases, it probably acts as a revellent, its excitant agency making a new impression on the nerves, which detracts or derives from the erethism in the respiratory nerves. In cases, too, which are dependent upon paralysis of those nerves, the excitant influence of galvanism may be beneficial. In the same way, we explain the salutary agency of the plates in epilepsy (*Mansford*); in angina pectoris, and in neuralgic affections of the chest especially, (*T. Harris* and *Prof. Chapman*, of Philadelphia); and in paraplegia, (*Prof. Miller*, of Washington.)

Cases of good effects from the action of the galvanic battery have been recently published, (*Hays*, of Philadelphia,) the galvanic current being made to pass from the mastoid process to the superciliary ridge. (*New Remedies*, p. 514.)

Galvanism has likewise been suggested as a remedy in cases of asphyxia, and the suggestion is good. It has, however, very often failed; and as the cessation of the heart's action is the cause of death, and galvanism exerts little or no influence on that organ, it is probable that it may not render as much service as was at one time anticipated. The battery forms part of every perfect resuscitating apparatus. (See the art. *Asphyxia*, by the author, in the *Amer. Cyclopedia of Practical Medicine*, vol. ii. 1836, and his *Practice of Medicine*, i. 421, Philad. 1842.)

47. The ELECTRO-MAGNETIC APPARATUS was brought forward as a valuable excitant a few years ago; but it did not appear to have any advantage over the ordinary mode of employing galvanism by the battery; whilst the shocks in rapid succession were often extremely disagreeable. It is now rarely employed, and, indeed, the same may be said of galvanism in general.

For some of the other inventions of a galvanic nature, proposed by different individuals—as the *anodyne metallic or galvanic brush* of Von Hildenbrand; and the *galvanic suppositories*, &c., of Harrington, the author may refer to a work already cited. (*New Remedies*, p. 515.) They are no longer used.

48. ACUPUNCTURE.

The operation of acupuncture, or *acupuncturation*, is performed by fine, well-polished, and sharp-pointed needles. These are usually from two to four inches long; and at the blunt extremity of the needle, a head of lead or sealing-wax is attached to prevent it from being forced entirely into the body. To introduce the needle the skin is stretched, and it is inserted by a movement of rotation, aided by gentle pressure. The number of needles to be used, and the length of time they should remain, must be determined by the nature of the case, and the judgment of the practitioner.

Acupuncturation is an old Japanese remedy, which was used in Europe a long time ago, and has been revived of late years in the same kind of cases, in which electricity and galvanism are employed;—for example, in rheumatic, spasmodic, and convulsive affections, amaurosis, paralysis, &c.; and it has even been proposed to pass them into the heart in cases of asphyxia! In rheumatic affections its success has been marked, Dr. Elliotson having cured thirty out of forty-two cases by it. It has also been used in gout. (See the author's *New Remedies*, p. 39.)

When acupuncture is conjoined with electricity or galvanism, it constitutes ELECTRO-PUNCTURE or GALVANO-PUNCTURE. The operation consists in employing acupuncturation in the usual way, either with a single needle, or with two or more, and making a communication between them and the prime conductor of an electrical machine; or they may be made to form part of the circuit in the discharge of a Leyden jar. In this way, the electrical influence may be graduated from the simple aura to a full shock. Both it and galvano-puncture have been used in the same cases as acupuncturation, and especially in rheumatic and neuralgic affections.

Galvano-puncture has been employed in cases of asphyxia: it has even been suggested to pass the needles, on each side, between the eighth and ninth ribs until they reach the fibres of the diaphragm, and then to establish a galvanic current between them, by means of a pile of 25 or 30 pairs of plates, an inch in diameter. Sometimes the circle was interrupted, at others continuous. This plan was tried by Leroy d'Etioles, on animals asphyxied by submersion; and, when they had not been under water more than five minutes, they were often restored. As an aid, therefore,—as the author has elsewhere said,—to pulmonary insufflation, galvanism, combined or not with acupuncturation, might be employed in asphyxia; but it cannot often, perhaps, be available; certainly, no time should be lost in adopting the other energetic and indispensable measures that are demanded. (*Practice of Medicine*, i, p. 429.) It has been recommended that as only a very small apparatus is necessary, batteries, consisting of a few plates, might be kept wherever there are station houses for the reception of persons in a state of asphyxia. This suggestion also is good, and they might form a part of the cabinet apparatus of the private practitioner; but whilst an assistant is preparing the apparatus for action, the practitioner should be assiduously engaged in employing other means of resuscitation. (*New Remedies*, p. 204.)

49. EXCITANT GASES.

Of the gases, whose effects, when inhaled, are excitant, but two have been used,—Oxygen and the Protoxide of Azote; neither of which is much employed as a therapeutical agent at the present day.

a. OXYGEN GAS.

This gas, which is so essential to respiration as to have been termed *vital air*, has been subjected to numerous experiments, the general results of which are, that it acts upon the human organism in a positively deleterious manner; that although an animal may live in a limited portion of it for a considerable time longer than in the same quantity of atmospheric air, its respiration becomes hurried and laborious before the whole is consumed, and it dies, although a fresh animal of the same kind is capable of sustaining life for some time in the residuary air.

Oxygen gas, for therapeutical administration, may be made from *black oxide of manganese*, exposed to a full red heat in an iron retort, the gas being transmitted through water.

It has been advised as an excitant inhalation in chronic debility of all kinds; and especially in anæmia, chlorosis, paralysis, &c. It should be diluted with from ten to twenty times its bulk of atmospheric air, increasing the proportion of oxygen according to the effects induced. From one to two quarts of oxygen may be breathed in the course of the day. It is said to augment the force and velocity of the pulse. (*J. Murray.*)

b. PROTOXIDE OF AZOTE.

This gas, called also *Nitrous Oxide Gas*, *Protoxide of Nitrogen*, *Paradise*, *Intoxicating* and *Laughing Gas*, is now rarely used except for purposes of exhibition. It may be obtained for medicinal objects by decomposing nitrate of ammonia by means of heat, and transmitting the gas through water. The hydrogen of the ammonia attracts part of the oxygen of the nitric acid, and forms water; and the remaining oxygen combining with the azote both of the acid and the ammonia, forms the protoxide.

The effects of this gas, when inhaled, are usually singular and delightful. It was breathed by Sir Humphry Davy, Mr. Southey, Mr. Wedgwood and others, whose sensations have been detailed by Sir Humphry. The effects are most exhilarating and excitant, and they are not followed, in the generality of cases, by depression. It is apt, however, to disagree with those whose nervous systems are very impressible, and might be dangerous to such as are predisposed to encephalic or cardiac disease. On some few its effects are by no means agreeable, or transient.

Possessed of these powers, it was not surprising, that the inhalation of this gas should be regarded with interest as a therapeutical agent. It has not, however, answered the expectations of experimenters. It has been inhaled in paralysis, and apparently with advantage; but it is difficult to say how much of the benefit was owing to the inhalation, and how much to the effect on the mind of the patient. (See page 57.) The quantity required to produce its effects is usually from four to nine quarts, which may be inhaled pure or mixed with an equal quantity of atmospheric air. It cannot be breathed undiluted for more than four minutes and a half, (*J. Murray;*) consequently, its effects must be watched. It is hardly ever used at the present day.

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